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ABSTRACT

The effects of a facilitating model on college students were examined in a creativity study. Predictions were as follows: those modeling a creative experimenter would show more creativity than would control group subjects; those scoring high on the "Torrance Test of Creative Thinking" would also score high on the "Remote Associations Test (RAT);" and those scoring high on the "Khatena-Torrance Creative Perception Inventory" would also score high on the other two measures. Subjects were University of Redlands students, who were placed in two groups of 20 (10 male, 10 female). The experimental group received instructions from a facilitating instructor, while the control group received regular instructions. Analysis of variance showed significantly higher Torrance elaboration scores and RAT scores for the modeling group. Originality means for both groups were identical. Intercorrelation of measures were not significant. Although no measure of creativity can be said to be valid, the findings indicate a positive and necessary step toward the recognition that creativity needs to be, and can be, facilitated even on the college level. A literature review is included, along with a bibliography and information on the tests. (Author/SW)

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THE EFFECTS OF MODELING ON THE CREATIVE PERFORMANCE OF COLLEGE STUDENTS

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Honors Thesis

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March, 1983

ABSTRACT

The effects of a facilitating model on college students were examined in an experiment on creativity. The predictions were that those modeling a creative experimenter would show more creativity than controls, that those scoring high on the Torrance Test of Creative Thinking would also score high on the Remote Associations Test, and that those who scored high on the Khatena-Torrance Creative Perception Inventory would also score high on the other two measures. The experiment was conducted with students from the University of Redlands placed in two groups of 20 subjects each (10 male, 10 female). The experimental group was given instructions from a facilitating instructor while the control group received regular instructions. Analysis of variance showed significantly higher Torrance elaboration scores and RAT scores for the modeling group. For elaboration, F (1,38)=5.483030; for remote association F (1,39)=4.326845; $p<.05$. Originality means for both both groups were identical. Intercorrelation of measures were not significant. Although no measure of creativity can be said to be valid, the findings here indicate a positive and necessary step towards the recognition that creativity needs to be, and can be facilitated even on the college level.

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THE EFFECTS OF MODELING ON THE CREATIVE PERFORMANCE OF COLLEGE STUDENTS

The topic of creativity has been the subject of much controversy among teachers, parents, students, psychologists and researchers. It seems doubtful that those in various professions with various beliefs and objectives will ever agree upon a common meaning. What do different theorists have to say about creativity and its development? Many questions, theories and past research results must be evaluated before any new research investigating creativity can be generated. I have completed a rather extensive review of the literature relevant to the subject, which familiarized me with the subject, and provided background for my project. The project is an empirical study of the effects of modeling on creativity in college students. The review includes the definitions, history, and theories of creativity, what prevents creativity, new ideas in teaching, the measurement of creative potential and ability, and creative characteristics. I also address the question of whether creativity can be fostered.

Definitions, History, and Theory

The numerous definitions of creativity are similar and dissimilar; it appears that no one has ever agreed upon a universal definition for creativity. The Random House Dictionary of the English Language (1967 defines the term as "The state or quality of being creative," and defines the latter as "having the quality

or power of creating and that which results from originality of thought, expression, etc..." (p. 341). However, when the Council of Scholars of the Library of Congress met in 1980 for a symposium to discuss creativity, they came to the conclusion as one member put it, that "Creativity is a confused and therefore debased conception" (Moyers, 1981, p.64). Many agreed when Ronald Klein (1982) said that creativity was like the terms "freedom," "liberty," and "quality education;" that it is a term more easily used than understood. These definitions relate numerous ideas because of the way that each chooses to look at the term. Bernard Malamud, a respected novelist, commented, "Creativity is a complex thing...maybe some time in the future they actually will find the genetic tissue that makes it what it is. I don't want to be around when it happens. I want it to remain forever a mystery" (Moyers, 1981, p.65). Everyone, it seems, has his own specialized perspective. Mansfield and Busse (1982) describe the problem.

> Mention creativity and some people immediately think of monumental achievements, such as Einstein's theory of relativity or Michelangelo's Sistine Chapel. Other people deem any activities in music, literature, and the arts to be creative be definition. Still others see creativity in the clever and original ideas expressed by young school children. Perhaps because of the diversity of phenomena that have been called creative, researchers studying creativity have developed different definitions. (p.386).

Definitions also manifest themselves in theories, and by reviewing these theories of creativity and its origins, one is further able to understand its diversity.

It is interesting to look at the diverse definitions and theories on creativity throughout history. The term has undergone

development from being a religious belief to a psychological concept, from a neurotic trait to a component of mental health, from a curiosity to an end in itself (Ainsworth-Land, 1982). What will be addressed here are various theories of creativity, its motivation, and its place in society.

Herman Helmholtz, a German philosopher and scientist, talked of creativity, describing it as consisting of three stages: saturation, incubation, and illumination. Saturation consisted of gathering data, facts, and sensations so as to serve for the development of new ideas. Incubation involved shifting materials around and making new combinations, this being an unconscious effort. The last stage, illumination, occurred when the solution or means to the end came to mind (Whiting, 1958).

Sigmund Freud, father of psychoanalysis, is not well known as a creativity theorist; however, since his approach is incompatible with most recent theorists, it deserves mention. Freud considers that the forces motivating or setting the artist into action are the same as the conflicts which drive others into neurosis. According to Freud, we can find the foundations of conflict in the unconscious; we find in the unconscious too (as Helmholtz did), creativity as well as the neurotic solutions to conflicts. Freud does not see creativity as being destructive; rather it is quite helpful to the individual. Like the defense mechanisms, creativity finds its roots in childhood. A current event stirs up a menory arousing a wish which, in turn, finds its fulfillment in a creative work (Freud, 1949, 1950). Freud's view of creativity provides an interesting

contrast to other definitions of the construct.

E.G.Schachtel (1959), a perception theorist, views the creative individual's motives and the quality of his relationship to the world as unique; this view is different from the psychoanalytic interpretation. He defines creativity as the "art of seeing the familiar fully in its inexhaustible being, without using it auto-centrically for purposes of remaining embedded in it, and reassured by it." In other words, it is the ability to remain perceptually open to the world which marks an individual as creative. This does not make reference to the unconscious. He appears to take more of a "here and now," self directed approach to creativity.

Max Wetheimer, father of Gestalt psychology and investigator of the associationist theory, speculated that productive thinking was a chain of ideas, or as behaviorists would say, a chain of stimuli and responses. It is the art of reasoning borne of habit and past experiences which is the essential element in thinking, not the repetition that so many educators practice. So to think productively or creatively depends on the functioning of these bonds and on the number of past associations a particular person has acquired (Getzels and Jackson, 1962). Two more recent theorists, Mednick and Mednick (1964) developers of the Remote Associations Test, interpret creative thinking as the forming of "...new combinations of associative elements, which either meet specified requirements, or are in some way useful. The more mutually remote the elements of the new combinations, the more creative is the process or solution" (p.55). In simpler terms, if one can look at a number of seemingly

disparate elements and either combine them in some sensible fashion, or relate them in some way, one is creative. Mednick and Mednick specifically emphasize the degree of remoteness of associations as a manifestation of creative ability.

A Gestalt or holistic theorist like Morris Stein (1974) does not look at the various associations an individual makes; instead he examines the individual's responses to various problems within his or her "field". The "field" includes (1) the main stimulus or figure; (2) the background; and (3) the person(s) involved (p.233). Stein tells us the more creative a person is, the more time he or she will spend analyzing a particular problem. To the holistic theorist, creativity like other behaviors is a function of transactual relationships between the person and his environment. Intrapersonal communications play a part in this too; they are the dialogues the person has within himself when he stands back to view and assess his work. These communications can serve as productive tools for nourishing, encouraging, and facilitating works. Creativity is man striving to improve himself. This theory is closely linked to that of Carl Rogers (1971), a humanist who defines creativity as "Man's tendency to actualize himself, to become his potentialities." The emergence of a novel product grows out of the uniqueness of the individual, and out of the materials, events, people, or circumstances of his life (Rogers, 1954). One could conclude, then, that creativity is the act of becoming itself. The holistic and humanistic views have many similarities, the two views are complementary.

J.P.Guilford and E.Paul Torrance have worked closely in a number

of studies exploring the notions of creativity, and addressing its problems and solutions. These educators, through careful observation and analytic thinking, have narrowed the broad scope of creativity down to a body of elements. Torrance (1974) proposed that creativity be broken up into dimensions of fluency, flexibility, originality, and elaboration. Torrance defines fluency as the number of different ideas a subject can think of. Flexibility consists of the number of different categories into which responses fall (for instance, body parts, animals, or accessories.) Originality is characterized by novel or unusual responses which are not obvious and commonplace. And elaboration relates to the number of details put into working out a new idea (such as color, body parts, and decoration.) Guilford (1967) determined eight categories of creativity including Torrances' fluency, flexibility, and originality elements. He added sensitivity, penetration, analysis, synthesis, and redefinition. To Guilford, showing sensitivity means seeing needs and seeing the unusual. Penetration is making remote associations. Analysis refers to the ability to recognize relevancy, for instance being able to analyze a paragraph into five basic ideas. Synthesis is one's closure ability or one's ability to combine elements together to make a whole. And redefinition means the shifting of a function such as revising an interpretation or changing the use of objects. Guilford and Torrance have adopted and invented certain tests to serve as predictors of the presence of these elements in subjects. Both have attempted to influence educators to identify and facilitate creativity. They are determined to show educators that these elements can be measured, and

that creativity should be part of a student's education.

The Creative Inhibitor

Although many more people now appear to be concerned with creativity, it doesn't seem to be more in evidence in education or in society. What in our society hinders its growth? As numerous researchers and educators conclude that environmental factors do indeed play a critical role in blocking or facilitating the creative process, they say that it's most likely that individuals would reveal more creativity if they were in environments that valued and supported its functioning.

Educator Doris Shallcross (1981) says it is clear that society, or environment, has an impact on creative expression. Our society is organized to protect and supposedly advance its citizens. Problems surface, Shallcross tells us when:

> Organization takes on a life of its own and is responsible for dehumanizing its members making them feel individually insignificant. A society shares a set of mores and traditions and is characterized by collective activities, interests, and behaviors. Often an individual member feels it is immoral to deviate from the norm, to appear to differ from the written and unwritten laws of his or her particular group. Whether the society be a nation or a street gang, deviations of behavior from the group's established patterns can evoke punishment or exclusion. Therefore, unique behavior, suggested change, and the like, are considered subversive and threaten affiliation. (Shallcross, 1981, p.57).

Individuals then, feeling the tensions in their surroundings, will withdraw in order to feel accepted and more a part of the whole group. It is the organization, the traditions, the assumed expectations of others, the fear of looking different or taking risks which

are a few factors inhibiting creative behaviors and making these behaviors a rare find.

Stanwood Cobb (1967) agrees that creativity is very dependent on society as well. He states that man can not even conceive of creative work or achievement in an environment which gives him no background, no starting point, and no receptive public. "In this sense it is true that many a flower has been born to blush unseen and waste its fragrance on the desert air" (p.13). Cobb points the finger of blame on public education which he says, "favors and tends to foster mediocrity" (p.17). The public schools promote lax systems, beginning in the primary grades and finishing in the college level, and because of these systems, poor students are allowed to graduate and better students are learning to more or less go with the flow, asserting little effort. What is favored in most schools today? The learning methods of memorizing only to reproduce at examination time, and of using solely the materials handed out, nothing more and nothing less. The overall goal? To be able to churn out that one single correct answer (Faefele, 1962, p.164). This type of study may be analytical and critical, but so far creativity has not had an important role in the majority of educational institutions today.

Let's look at the criteria set by many colleges when evaluating prospective students, as an example. Gretzels and Jackson (1962) find the two most common criteria are: (1) the scholastic aptitude measures, and (2) school recommendations based on teacher evaluations of student characteristics. School grades aside, these two

standards are what are hurting the highly creative and favoring the highly intelligent. The high creative's scores and teacher recommendations are likely to be lower because of the creative's independent ways. They are often times labeled something like a "greasy grind", or a "mid-class striver", which makes the application frequently overlooked in the admissions office. Getzels and Jackson feel it ironic that the very students who may be potentially most creative and a benefit to our society, are also more likely than most to be pushed away from the college doors because of test and admissions criteria (p.32-33).

This is not to say potential creatives don't go to college, because they do, but problems still persist. Paul Heist (1968) from the Center for Research and Development in Higher Education, has done extended research dealing with "valued" students in college. Heist found that many potential creatives were leaving colleges within the first few years because of the lack of a stimulating faculty, because of too much assigned work and drilling, and because of competition. One of the fundamental problems with the college faculty, Heist says, is that even though they may be professionals in their subjects, they are amateurs in their role as instructors. Moreover, they don't know anything about their students. Most aren't aware and therefore can't appreciate the many talents and motivations existing in their classes. Many don't seem to understand the need to be concerned about an individual's aspirations, interests, and problems (Heist, p.194). Personalization to college, between student and teacher, appears to be of extreme importance.

Teachers and students instead tend to follow the rules of the game without asking questions, without challenging the old, and without taking a risk. It is a safe and satisfying system for many, but for others it is obviously frustrating and intolerable enough to make them leave (p.195).

James Adams (1979), a college administrator, offers one possible explanation of the adult's creative inhibition; unlike the child, the adult is much more aware of his practical constraints. Another he mentions is that "our culture trains mental playfulness, fantasy and reflectiveness out of people by placing more stress on the value of channeled mental activities" (Adams, 1979, p.56). We are spending too much time trying to solve the world's problems with what we already have instead of imagining new methods and solutions. The old should not be disregarded, but the new should not be shunned. We need to revert to our childhoods to find the characteristics for growth, because with age comes the movement away from the child's well-organized early curiosity, his joy for the new, and his motivation to uncover the unknown, to explore the unexplored, and to seek out excitement (Schachtel, 1959). "The child's universe yearning to be explored," as Schachtel puts it, is turned into a cocoon in which he is embedded. This cocoon

> ...at which he arrived is larger than the womb was, and while in it there are many more objects than the infant ever dreamed of, they're aliveness, just as the man who has "matured" to the state where he does nothing but contribute to the protective uniformity of the cultural cocoon has lost his enthusiasm, his capacity for growth, the essential and specifically human capacity to remain open toward the world, that is, to transcend a closed pattern of reactions and thus to encounter and perceive the new, that which transcends the labels of his

> patterned experience, be it in a new object or in an object encountered many times (p.54).

So should it be assumed that creativity is in a trap that it cannot get out of? This trap or cocoon is the fault of our confining society, and it is only through the cultivation of creativity that we can hope to free creative behavior.

Caroline McAllister (1980) and other educators have realized, it is the instructor who is a key figure in the pursuit of creativity. E.Paul Torrance (1970) says that the necessity for the teacher to guide the learning of creativity should be obvious, because without this guidance students will cease to develop after some time and will become discouraged. To give a clear picture of what he means by a "guiding teacher" or learning experience, Torrance contrasts learning by authority with learning creatively. Learning by authority involves such abilities as recognition, memory, and logical reasoning - the more traditional abilities. In contrast, learning creatively includes creative and problem solving activities as well as recognition, memory and logical reasoning. It requires abilities such as evaluation, divergent production (fluency, originality, flexibility and elaboration), and redefinition. Creative learning and the development of these abilities, Torrance concludes, will stay with the student longer as he proceeds in school or in a vocation. This type of education, because more easily applied than traditional education, is of utmost importance; it is the teacher who is to guide this education.

In order to identify what kind of teacher would be advantageous

for such learning, J.A.Chambers (1973) went to creative adults and asked them about the teachers who influenced their creative development.

> The facilitating teachers were usually well prepared for class and taught in an informal manner. They accepted disagreement from students and were likely to use it to stimulate discussion. Their students saw them as hard driving, dynamic, and intellectually demanding, with a personal interest in teaching and a high level of commitment to their field. They gave extensive encouragement to their students outside of class...(Chambers, pp.326-334).

Chambers found though, that those teachers who were most influential were encountered in the graduate years as opposed to the undergraduate years, and the most influence and encouragement came from outside the classroom. Creativity must be fostered in the classroom as well as outside the classroom, however.

Teachers in general are interested in bringing creativity into the classroom. While in a creative teaching session in California (Williams, 1967), teachers were asked what they thought about using creative and productive thinking processes in their classrooms. Eight percent thought that they were creative teachers and that the training helped them substantiate what they were already doing. Thirty-two percent were curious to learn how to use creativity in their classrooms, especially in its application to subject matter. Sixty percent consisted of those who related that they had always wanted to experiment in this area, but were uneasy about it because of possible time loss and because of non-accepting administrators. Teachers need to assert their beliefs in the classroom for the students' sake, and for their own. Specific changes in teaching will lead not only to an overall better education of

children and young adults, but to the cultivation and facilitation of creativity.

New Ideas in Teaching

Most researchers and educators would agree we need to develop new ideas for teaching methods and subject matter. These methods should nourish the curiosity, interest and motivation of overtly creative students, as well as stimulate the creativity of those who have not yet fulfilled their potential (Stein, 1974). Creativity in a classroom does not have to mean outright chaos which allows students total freedom to express themselves in any way they wish. It also doesn't suggest the abdication of the leadership role of the teacher; he or she is still in charge. Creating a productive climate, she says, doesn't mean that anything goes; in fact, it puts much more self discipline upon the individual, being most effective when the individual has a sufficient structure within which to feel secure (Shallcross, 1981). If people know they won't be pushed down or ignored, they will most certainly be willing to take risks.

Feldhusen and Treffinger (1977) draw similar conclusions concerning the classroom and creativity. They believe that in order to foster creativity in the classroom, the atmosphere needs to be one which is receptive to new thinking. It needs to have what they refer to as a "positive reinforcing and accepting air", to breed creativity.

The big question now is, can it be done? Williams (1967) found that he could train his students effectively in fluency, flexibility,

and originality without any loss to the originally planned academic lessons. Williams uses this instance as support for his argument that by changing time allotments spent in routine tasks demanding information retrieval to those involving more cognition, divergent thinking, and evaluation, we might find more production and achievement in the classroom. To test this thesis, Williams (1967) gave part of his seventh grade class a wide variety of thinking experiences and they achieved a much higher level of production than did the other half placed in a more traditional setting.

Rusch, Denny, Ives (1965), investigated and compared two classes of elementary school students; one (the experimental group) was taught creatively for the year, and the other (the control group) was taught in a traditional manner. Teachers of the experimental group classroom encouraged divergent thinking by supporting a student's original response during a primarily convergent thinking lesson. The teachers were also concerned with creating a climate of mutual respect and acceptance by introducing students (in areas like art and writing) to the works of professionals. After exposure to these works, students discussed them, making comparisons and stating personal reactions. Students were also encouraged to work with the teacher, but not to be afraid to venture on their own. To measure the effects of this experiment, seven divergent thinking tests were administered at the beginning and at the end of the year. The experimental group attained superior results in five out of the seven tests by the end of the year, while the control group did not excel on any of them. From this study and others, it can be concluded

that creativity can be taught through the use of properly trained instructors.

To teach for creativity Torrance (1962) says the teacher must be "highly sensitive, resourceful, flexible, and willing to get off the beaten track" (p.195). To foster creativity Torrance (1961) suggests five principles of teaching:

(1) to treat pupil's questions with respect;
(2) to treat imaginative ideas with respect;
(3) to show pupils that their ideas have values;
(4) to permit pupils to do some thing "for practice" without threat of evaluation; and
(5) to tie evaluations in with some causes and consequences.

In a four week study, children in different grades were taught using these principles. Pre and post-test comparisons showed superior gains for the experimental group over a control group. The experimental group had better scores in elaboration and originality in four out of the six grades tested, superiority in fluency in three of these grades, and in flexibility in two of the grades.

Different teaching approaches have proven to make a difference in children, but it is also important to look at the effectiveness of teaching for creativity in higher education. Two researchers, Parnes and Meadows (1960), have studied the older students in a creative problem solving class at the University of Buffalo. The technique in this class differed from a traditional classroom setting in that students were given practice in examining problems from various standpoints, and they were taught the many complexities involved in analyzing problems, amalgamating techniques and methods for solution, and given practice listing possible solutions. Students were also encouraged to take their own problems on stage for

potential creative resolution. Parnes and Meadows found that the experimental group made significant gains over the control group's efforts in the quantity and quality of ideas generated. The researchers checked up on the students a year later to see if this increase in creative output had persisted; the experimental group still performed significantly better in quantity and quality scores than did the controls.

Clearly the teacher's role is one if not the all important factor in creativity in the educational setting. Bandura (1977) sees the teacher as a model for the student to imitate and learn from; this is why the exhibited behavior of the instructor and the structure of his or her classroom is so important. Experiments conducted by Miller and Dollard (1941) are supported by Bandura (1969). These experiments involved a series of two choice discrimination problems, where a leader (trained) responded to stimuli in the environment that was hidden from the subject so that the subject was forced to rely upon the model's behavior. Leader's choices were consistently rewarded and so were the subject's when he chose the leaders response. It is shown that subjects learn to follow respective models, and will generalize copied responses to new situations and models.

The model, Bandura explains, is contributing most to the creative development in the beginning stages of new thought or behavior. In other words, it could be a teacher's partial departure from what is seen as common that becomes in itself a new direction. He looks to the life progression of various creatives' careers as examples or support for his theory. "For instance, Beethoven adopted the

classical forms of Haydn and Mozart, though with greater emotional expressiveness which foreshadowed the direction of his artistic development" (p.48). It is the same too, he notes, with successors from every field who have taken what others have given to build up a base for themselves, something original and novel. Bandura sees education in the same light, but while he admits that institutions are equipped with some of the ingredients needed to bring out discovery, he is saddened that they also impede its cultivation. Education gets wound up in the familiarity of routine, and as long as these routines prove to be adequate, people seem to be satisfied. The answer is in modeling which can change a student's desire to perform like everyone else, to one displaying novel responses to common situations. People who are exposed to divergent thinking models or teachers are "indeed more innovative than those exposed to models who behave in a stereotyped conventional fashion" (p.49).

Further support for Bandura's thesis is a research study conducted by Harris and Evans (1974), who questioned the effects of modeling and instructions on creative responses. They took college students and randomly exposed them to a divergent thinking symbolic model (DM), a convergent thinking model (CM), no model (NM), or instructions encouraging creativity (I). They were tested on four creativity tasks that were different in levels of similarity to the model. Prior to testing, subjects read the instruction "List as many uses as you can for a paper cup." Subjects in the NM group saw a page of ruled lines, numbered 1-30. Subjects in the I group saw a page of lines numbered 1-20, but at the bottom appeared: "It

has been found that people are often much more creative than they realize. Please answer the entire questionnaire as a very creative and innovative person would." CM subjects saw 20 responses written in, all using the cup as a receptacle: e.g. "for KoolAid", as a planter", etc. The DM model group saw 20 responses of different types: e.g. "use as a foundation for beehive hairdo", "use for building blocks", etc. Subjects were told that they would be tested on the next page, and that this was only a sample answer sheet. Results indicated that exposure to divergent or convergent thinking models can cause the student to perform similarly in response on an identical or similar task. The subjects responded more originally or creatively when given instructions to be creative than when given no model or instructions. Thus modeling and teacher behavior coult be factors in eliciting creative behavior.

Measurement

The teaching methods described above are generally evaluated with tests designed to measure creativity. But can creativity be measured, and if so, how? The need to measure creative behaviors is critical for those involved in the analysis of creativity (Shallcross, 1981). Tests for measuring creativity have been developed by educators and psychologists. The tests seek to measure creative motivation and behavior.

Mednick (1962) developed the widely used Remote Associations Test which measures the individual's ability to make remote associations. The subject's task is to give a word which can be linked to

three other seemingly unrelated words. In order to represent a creative problem solving skill the scorer's response must be relative to a particular problem so as not to be labeled noncreative and worthless (Caron, 1963). The Remote Associations Test is generally concerned with exemplifying the potential values of intuition and unconscious thinking processes (Stein, 1967).

Among the numerous tests for creative ability that Torrance, the father of creativity tests has produced, is the widely administered and respected Torrance Tests for Creative Thinking (1966). This test measures the fluency, flexibility, originality, and elaboration abilities believed to be strong in the creative individual. The Torrance test contains three separate tasks. The first task (Activity 1) is called Picture Construction; the subjects draw a picture using the given shape as a part of the picture. The second task (Activity 2) is called Picture Completion, subjects are given a number of incomplete figures to complete. The last task (Activity 3) is called Circles; two pages of circles are given for subjects to make pictures with. The tasks involve different kinds of thinking, and are fairly complex, having features that make use of what is known about the nature of the creative thinking processes, the qualities of creative products, and creative personalities (Torrance, 1976). It is important, Torrance says, to be able to identify and develop creative talent, but it is equally important to have distinct procedures which will discover these hidden talents (1970).

In identifying creative talents researchers have found that using checklists, questionnaires, and inventories which ask for

biographical information to be most promising. (Roe, 1963). One such format is the Khatena-Torrance Creative Perception Inventory (1976) designed by Joe Khatena and Torrance to reflect the extent to which people are able to function creatively. Biographical check-lists and other similar techniques have been successful in identifying creative talent as well as predicting successes in artistic, literary and scientific creativity (Anastasi and Schlefer, 1969).

With the testing and measurement of creative ability one may wonder if the individual has been lost among the categorization and data. Through measurements and predictions are we losing what is spontaneous and unique in the creative factor? Ronald Klein (1982) defends creativity assessments by saying that they can't do any harm.

> It may be that measuring creativity is like trying to catch butterflies with a bear trap - it is a little clumsy and not at all effective. It may be important to recognize the variations among butterflies than to capture them at all. If we can learn to develop the characteristics of creativity and encourage individual's unique creative behavior, then we will probably have more of it around to appreciate. And that is the point of the hunt, isn't it? (p.264).

Purpose and Hypothesis

Whether we are looking at the definitions, the theories, the problems, or solutions, it seems apparent that creativity does or should play an important role in our present and future society. To increase creativity we must start somewhere; it appears that educational institutions for young and growing minds is the most obvious point of departure. More studies need to be conducted in

the classrooms, and more new teaching methods need application, especially on the college level because these students are the closest to mingling with the problems of the world. The problem is that on the college level students lack sufficient instruction for creative behavior. The purpose of the present study is to determine if creativity can be taught. The author proposes to show that if college students are subjected to a creative model they will score higher on tests of creativity than students subjected to a more traditional model. The creative model would be one who encourages novel thought and description, and who gives pictorial examples for students to get ideas from. The traditional model on the other hand, would go by the book without giving any extra examples for students to follow. The author also intends to show that those who score high on one kind of creativity measure will also score high on others. With this in mind, the author intends to show that those who score high on creativity measures will display creative potential on a creative perception inventory.

The tests to be used in this study to measure creative abilities are The Torrance Tests of Creative Thinking (1966), and the Remote Associations Test. These two tests were chosen because they measure different kinds of creativity, and because they are highly acclaimed. Elaboration and originality will be scored for the Torrance test. Elaboration was chosen because it is easy to score and demonstrate by modeling. Originality was chosen because of the stress that is put on originality or novel thought in previewed literature, and because of numerous studies of creativity use the mean elaboration

and originality. The Remote Association Test measures how well a subject can relate seemingly unrelated objects. The Khatena-Something About Myself Test, part of the Khatena-Torrance Creative Perception Inventory will be administered to subjects to measure creative perception or potential, and to assess the relationship between potential and behavioral measures. It is an easy test to give, take and score.

Method

Subjects

The experiment was run in two groups with 20 subjects from the University of Redlands in each group (10 male, 10 female).

Materials

Test materials used for this experiment were the Torrance Tests of Creative Thinking (figural), the Remote Associations Test, and the Something About Myself Test which is a part of the Khatena - Torrance Creative Perception Inventory. The Torrance tests were chosen because of the amount of credible literature and research that has been accomplished using these materials. Also, these tests are figural or nonverbal; they require the subject to demonstrate creative abilities visually or through the use of pictures. The Remote Associations Test was chosen because it required the subject to do the exact opposite: to verbally demonstrate creative thought. The Something About Myself Test is a relatively new creative perception measurement chosen to validate the other behavioral measures.

Procedure

In a preliminary study two groups of subjects were tested using the Torrance Test of Creative Thinking: Thinking Creatively-with Pictures, and the Remote Associations Test. One group of subjects was tested at a time. When each subject arrived, he or she sat down at a table with a few others; each subject was supplied a test packet (face down) and a pencil. In the center of the table there was a pile of assorted crayons for the subjects to use if desired. When all the subjects had arrived, the experimenter introduced herself, briefed subjects (see Appendix, Introductory Instructions), and then continued with specific instructions for each test activity. The instructions used for the first test were based on those found in the Torrance Tests of Creative Thinking Directions Manual and Scoring Guide (1974) (see Appendix, Thinking Creatively with Pictures). After each had read the first set of instructions printed in the test booklet as the experimenter read the same instructions out loud, any questions were answered. There were three activities or tasks in the first test: one picture construction, one picture completion, and a circles task; each task was given a ten minute time limit. Both groups were given the same initial instructions; the experimental group received additional clarification in that prior to each task, the instructor drew and explained an example on the board which stayed up on the board throughout the testing (see Appendix, Examples Given to Subjects in the Experimental Group). After the three tasks were completed and collected, subjects were given the Remote Associations Test (see Appendix, RAT). They were told that they had ten minutes to find a word that the "three given words" had in common (see Appendix,

Remote Associations Test Instructions). There were 20 sets of words containing three words in each set. The difference in instructions again was that for the experimental group the examiner wrote examples which remained on the blackboard throughout the test, while the control group were given these examples only verbally.

In a later study the methods detailed above were employed with a new group of students from the University of Redlands. This study differs from the previous one in that the experimenter administered the Khatena-Torrance Something About Myself Test (see Appendix, Something About Myself) prior to the other measures. Subjects were given ten minutes to place check marks by the appropriate statements.

The Remote Associations Test was the last test given in both testings. After subjects had completed this test and test materials were collected, they were debriefed and free to leave.

Data Treatment

Before any attempt to analyze and combine the new data, scoring reliability in the Torrance test needed to be established. This was done by tracing over subjects' (from the previous study) responses for the various tasks and rescoring for elaboration. The scoring procedures followed the guidelines set by the Torrance Tests of Creative Thinking Directions Manual and Scoring Guide (1974) (see Appendix, Scoring Worksheet). Test reliability was established for the experimental group, r=.975; and for the control groups, r=.946. Similarly when scoring the new Torrance tests, a second scoring was conducted to secure reliability.

Results

The effects of modeling versus regular instruction were measured by three dependent variables. Two of these were from the Torrance test (elaboration and originality), and one was from the Remote Associations Test.

Khatena-Something About Myself

In order to insure that the sample of subjects in the experimental group were similar in their levels of creativity, the a t-test was done.

Insert Table 1 about here

As can be seen in Table 1, the means for the two groups are very similar, and a t-test calculated on these data support this impression $t(38)=-.42$ $p<.05$. Obviously there were no a priori differences between subjects assigned to experimental and control groups.

TORRANCE TEST OF CREATIVE THINKING

One way Analyses of Variance (ANOVA'S) were conducted on the scores for both elaboration and originality. One variable consisted of the experimental manipulation (2 levels - creative model versus traditional model) the other, Problem (3 levels - Task 1,2, and 3).

For elaboration, a significant main effect for experimental manipulation was obtained, $F(1,38)=5.483030$, $p<.05$.

Insert Table 2 about here

Insert Figure 1 and Figure 2 about here

An inspection of the means presented in Table 1 and Figures 1 and 2 reveals that subjects scored higher on elaboration under the creative model (experimental) condition overall and in specific tasks.

Insert Table 3 about here

By looking at Table 3 and again at Figure 1, one can see that the same mean score was obtained by both the creative - model and the traditional model condition for originality, F(1,38=0. Table 3 and Figure 2 also show that subjects in the creative - model condition performed slightly better on Task 1 (picture completion), and on Task 3 (circles) of the Torrance test, but that subjects in the traditional model condition performed slightly better on Task 2 (picture construction), although this trend is not apparent in the overall test mean.

Remote Associations Test

The last dependent measurement analyzed between groups was the score attained by subjects on the RAT. A one way ANOVA conducted

on these scores showed that subjects in the creative-model group's condition scored significantly better than subjects in the traditional modeling condition, $F(1,38)=4.33$, p .05.

Insert Table 4 about here

These means reported in Table 4 show that subjects in the creative model condition did perform significantly more creatively than those in the traditional model group.

Correlations

In order to assess consistency in performance of creativity, intercorrelations were computed for the dependent measures. These will show whether a subjects high score on one measure would also be high on another.

Insert Table 5 and Table 6 about here

Table 5 show correlations and their probablities for Elaboration, Originality and Remote Association Scores. Something About Myself correlations and probabilities are shown on Table 6 for the last 11 subjects in each condition. All interscore correlations proved not to be significant at the .05 level. Consistency in performance was not supported.

Correlations performed with scores from the creative perception

inventory were not significant either. The highest correlation is that between the inventory scores and the originality scores for the experimental group (r=-.467).

All possible correlations are shown in figures (see Appendix) where individual scores are plotted to show overall group tendencies.

DISCUSSION

The purpose of this study on the effects of modeling on the creative performance of college students was to determine if creativity could be taught. Various tests were administered to assess if modeling creative solutions would affect a student's creativity performance. A creative inventory was given to some subjects to validate the other creative measures. Results showed that students under a creative model performed better on elaboration scores and remote association scores; however, originality scores for both modeling conditions were the same. Results suggest that the model's behavior did have an effect on the subject's scores on creativity measures; and that when specific creative behaviors are presented by the "teacher", creative responses can be elicited.

The Khatena - Something About Myself Test was administered to some subjects prior to other creative measures to show the initial equality of the groups. The experimenter was also interested to see if subjects who scored high on the creative perception inventory would also be the ones who scored high on the other creative measures. Although two tests are presented in the Khatena-Torrance Creative

Perception Inventory pack, one test was all that was needed to check validity. Total scores for the test can be used and were used for this particular measure, but individual scores pertaining to different characteristics may also be obtained from this inventory, if desired. The characteristics include: environmental sensitivity, initiative, self strength, intellectuality, and individuality. The subjects can have five separate scores or one total perception score. This study was concerned with subjects' total scores. Results showed that there were no a priori differences between subjects assigned to experimental and control groups. Results obtained by other measures could then be attributed to possible modeling influences on the subjects' performance on creativity tests.

The actual testing difference in experimenter behavior consisted of the model adding to regular instructions examples which were relevant to the task on the blackboard. The creative model, in her examples (to specific tasks) put on the blackboard, while subjects watched and listened, were to be facilitating either elaboration and originality (for the Torrance test) or remote associations (for the RAT). Results indicated this facilitation on only two of the three dependent measures (elaboration and remote associations). It is concluded that elaboration and remote associations are more easily demonstrated by examples, while originality, a more ambiguous term, is difficult to project to subjects. To model for elaboration, the experimenter simply put a lot of detail in her examples while she told subjects to keep adding on to their ideas. To model for remote associations, sample problems were put on the board and explained.

To model originality the experimenter used concepts in her examples which are considered by the Torrance Directions Manual and Scoring Guide (1974), to be original. The modeling of elaboration and remote associations was easier to make concrete than the modeling of originality which is more obscure and difficult to communicate. One more factor to consider as well, is that elaboration and originality were modeled using the same examples. It could be that students did not attend to the originality the experimenter was trying to convey because they attended more to the elaborative aspects of the examples.

The model was not only creative, but was also a figurative model. What the model did for the experimental groups was to provide a visual example, whereas the control groups' model gave only verbal cues. The examples given to subjects were visual, and results do confirm that these "visual" examples (at least in 2 of the measures) appeared to influence test scores.

In recognizing the use of visual constructs versus verbal constructs in the models, one should further investigate the possibilities concerning visual versus verbal learning. Cobb (1967) notes that although pictorial art is not as widespread as literary or verbal art, visual form or art is as innate to man as his or her ability to use words. The blackboard is after all, as common a classroom feature as desks and chairs. All of the diagrams and notes drawn in chalk by teachers indicate that much of what is learned relies on vision. It could be that because students have come to rely on blackboard diagrams, they will feel awkward without its presence and thus not perform as well. If this is the case in the

present study, then subjects under the modeling condition performed, in general, better than those in control conditions because familiar cues for learning were present.

This study suggests that there needs to be a richer acquaintance with universal nonverbal languages like those of movement and form, color and sequence, expression and feeling (Arnheim, 1979). Subjects in both groups received verbal instructions; but although verbal language is of course a valuable help in human thought and growth, it is not indispensible. Other forms of nonverbal language need to be considered (Arnheim, 1979). In fact, this is one of the secondary motivations behind the present study. It is the author's belief that if higher education is to serve a diversity of students, it must cater to all kinds of talents, and provide a number of different methods by which knowledge and comprehension may be acquired and expressed (Pace, 1966). What is stressed here is not that verbal language should be booted from our institutions or that visual language is better than verbal, but that they are two different kinds of thinking which should work together. Ovide DeCroley, one of Europe's greatest educators and a psychologist at a progressive experimental school in Brussels says "...aptitude in art is as universal as aptitude in language...education for centuries has trained children in the use of language, so that now universal facility is expected. We may equally expect to see universal facility in pictorial expression developed if enough attention is given to this aim" (Cobb, 1967, p.112). Also by developing this facility in pictorial expression we will be aiding to the nurturance of learning and creativity by providing subjects

more thinking tools to work with.

Producing a better, more complete climate for learning is what people like Cobb, Pace and DeCroley are talking about. The present study proposes modeling as its form for improving educational climate, particularly creativeness in the classroom. Modeling influences can create the generative and innovative behavior desired by concerned educators. The principle behind the modeling concept presented by Bandura (1977) and used in this study is that through abstract modeling students observe others perform various responses, and can therefore model or catch on to the ideas behind these responses. Regarding creativity modeling, support for this theory is found in group differences on elaboration and remote association measurements in the present study. It is important to note here that although one of the three measures of creativity (originality) was not fostered in the modeling condition, the other two measures provide sufficient support for predictions that modeling can influence performance, and creativity can be fostered.

One thing which is becoming more accepted is the reality that creativity is, and it cannot be ignored because for creativity to survive and grow it needs to be nurtured. What this study hoped to bring across is that education can do a great deal to promote creative performance if not actually to produce creative abilities (Guilford, 1967). Educators and psychologists have stressed the paramount importance of placing creativity in the classrooms, homes and businesses of today. Perhaps E. Paul Torrance summarizes it best:

...In almost all of the curricula thus far produced, there is

> much emphasis on seeing implications, producing alternatives, predicting trends, predicting the consequences of decisions, elaborating alternatives, asking pertinent questions, decision making, obtaining new information, recognizing and understanding one's own potentialities, changing one's own characteristics, and the like. There is a strong element of creativity in all of these. There is in them a future orientation... It seems to me that we have reached a stage in history where we must make a choice. In the past, we have been able to survive with static goals and concepts. Things are changing so rapidly that we can no longer survive, if we insist on thinking and living in static terms. It seems to me that we cannot afford to return to the old ways. We must accept the creative challenge (p.304 and 311).

This experiment has shown creative modeling to be a worthwhile approach in the nurturance of creative behavior. There is ample room and need for further investigation concerning this area. Man needs to get to work if he wants creativity to thrive; without its cultivation man will lose his identity, his input, and his place in society.

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TABLE 1

Results for the Something About Myself Inventory

Subjects	Group 1 (experimental)	Group 2 (control)
10	23	20
11	29	30
12	39	38
13	27	26
14	34	32
15	21	31
16	29	21
17	38	40
18	27	41
19	37	31
20	25	28
Totals:	329	338
Means:	29.909	30.727

* The first nine subjects did not take the creative inventory.

TABLE 2

Elaboration Means from the Torrance Test of Creative Thinking

Groups	Activity 1 (construction)	Activity 2 (completion)	Activity 3 (circles)	Total
Group 1 (experimental)	32.35	48.75	46.40	127.50
Group 2 (control)	26.70	41.90	37.50	106.10

TABLE 3

Originality Means from the Torrance Test of Creative Thinking

Groups	Activity 1 (construction)	Activity 2 (completion)	Activity 3 (circles)	Total
Group 1 (experimental)	2.3	6.05	20.55	28.90
Group 2 (control)	2.2	6.25	20.45	28.90

TABLE 4

Results for the Remote Associations Test

Subjects	Group 1 (experimental)	Group 2 (control)
1	6	1
2	6	6
3	7	4
4	11	11
5	6	2
6	3	3
7	6	1
8	7	2
9	5	11
10	10	6
11	7	9
12	9	5
13	6	3
14	10	10
15	11	5
16	7	6
17	11	1
18	5	10
19	7	8
20	11	7
Totals:	151	111
Means:	7.55	5.55

TABLE 5
Intra-group Correlations

Group 1

Elaboration	_____	-.194 (.207)	.305 (.096)	
Originality	-.194* (.207)**	_____	-.111 (.321)	
RAT	.305 (.096)	-.111 (.321)	_____	
	Elaboration	Originality	RAT	

Group 2

Elaboration	_____	-.180 (.223)	.157 (.254)	
Originality	-.180* (.223)**	_____	-.080 (.369)	
RAT	.157 (.254)	-.080 (.369)	_____	
	Elaboration	Originality	RAT	

* correlation

** significance

TABLE 6
Intra-group Correlations

Group 1

Elaboration	_____	.082 (.405)	.753 (.004)	-.188 (.290)
Originality	.082* (.405)**	_____	-.290 (.193)	-.467 (.074)
RAT	.753 (.004)	-.290 (.193)	_____	-.033 (.462)
SAM	-.188 (.290)	-.467 (.074)	-.033 (.462)	_____
	Elaboration	Originality	RAT	SAM

Group 2

Elaboration	_____	.223 (.255)	.219 (.259)	.374 (.129)
Originality	.223* (.255)**	_____	-.397 (.113)	.223 (.255)
RAT	.219 (.259)	-.397 (.113)	_____	.011 (.488)
SAM	.374 (.129)	.223 (.255)	.011 (.488)	_____
	Elaboration	Originality	RAT	SAM

* correlation

** significance

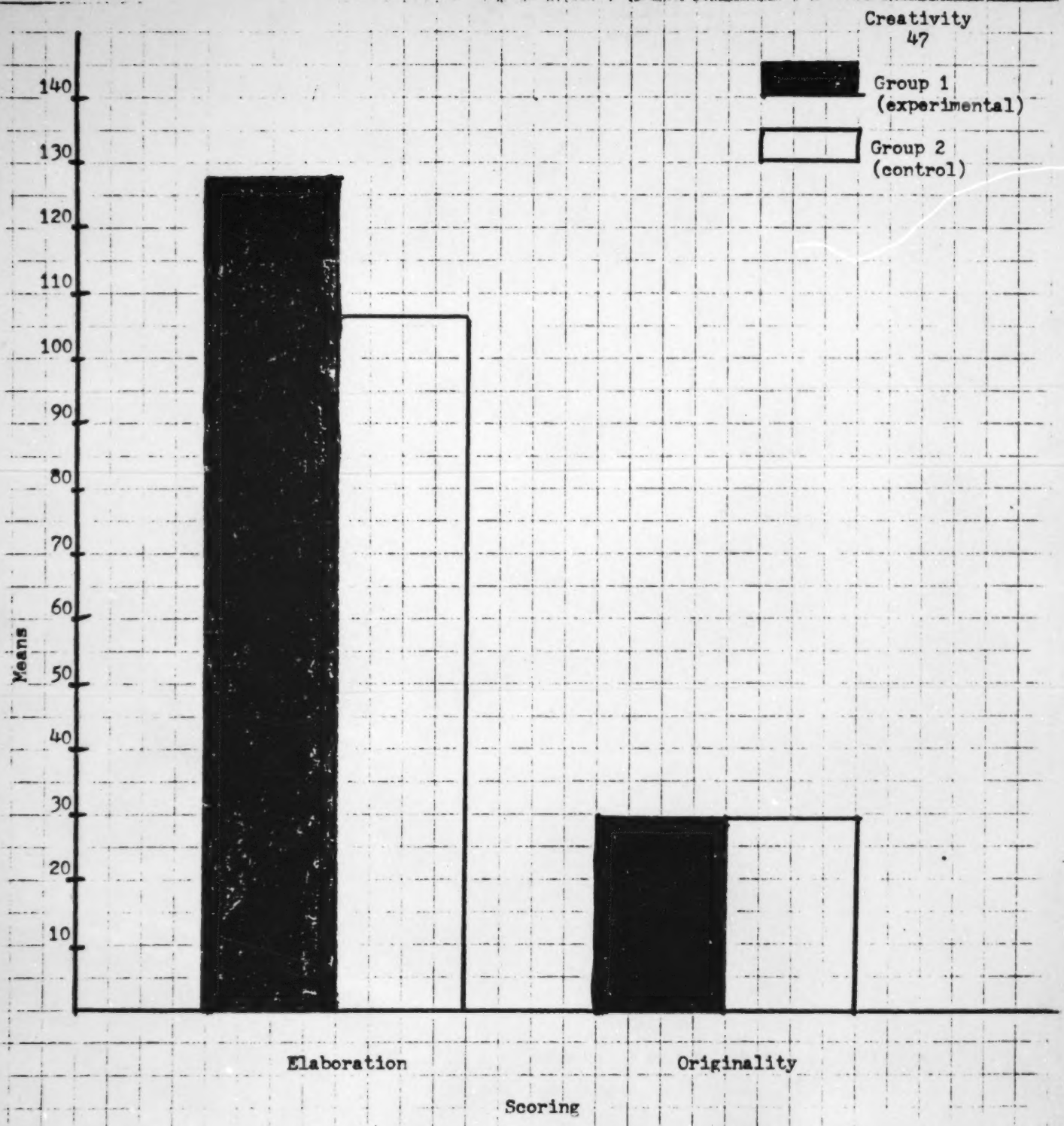


Figure 1. Total mean scores on elaboration and originality displayed by a control and an experimental group in tasks from the Torrance Tests of Creative Thinking.

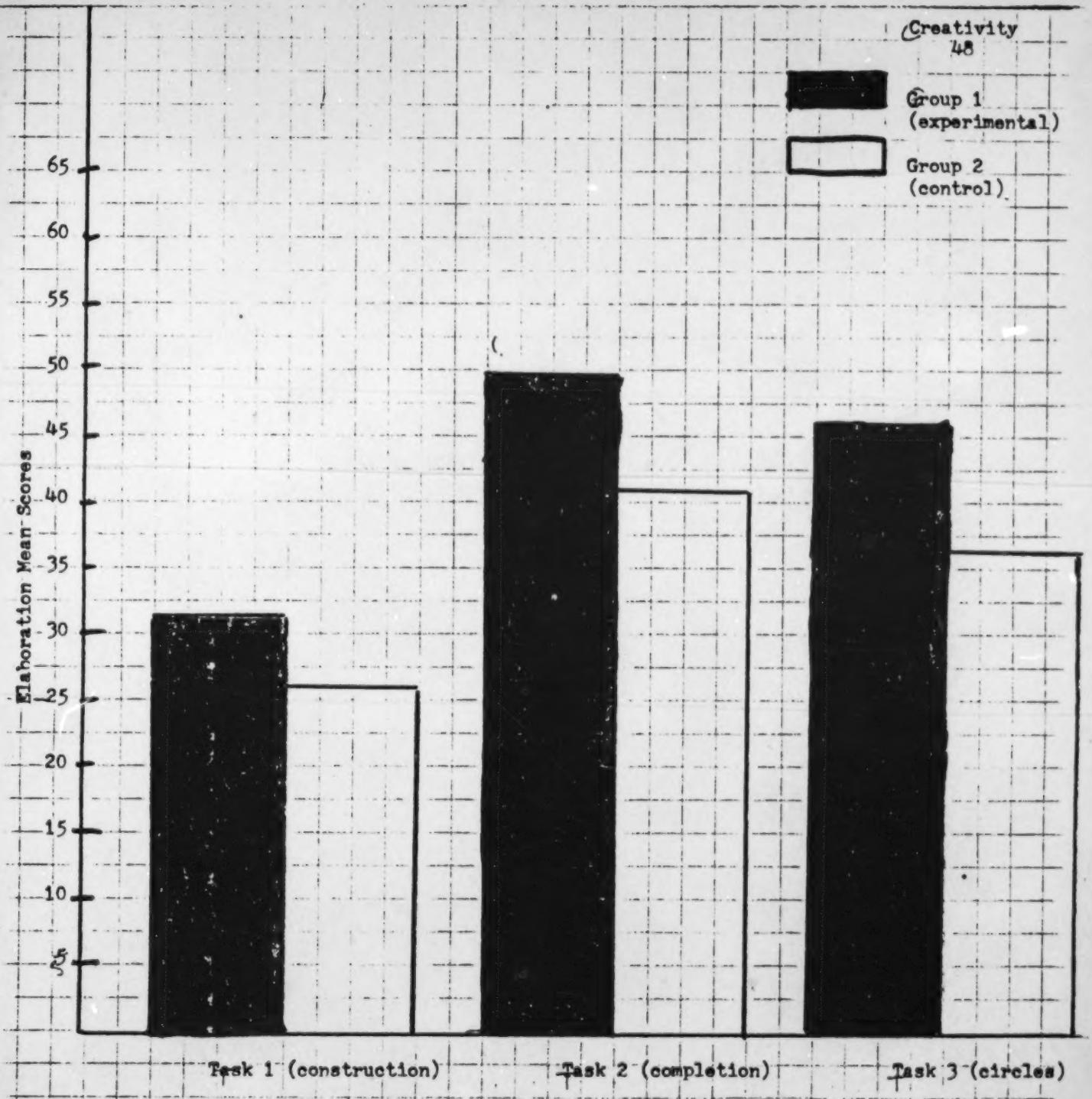


Figure 2. Mean scores on elaboration displayed by a control group and an experimental group in tasks from the Torrance Tests of Creative Thinking.

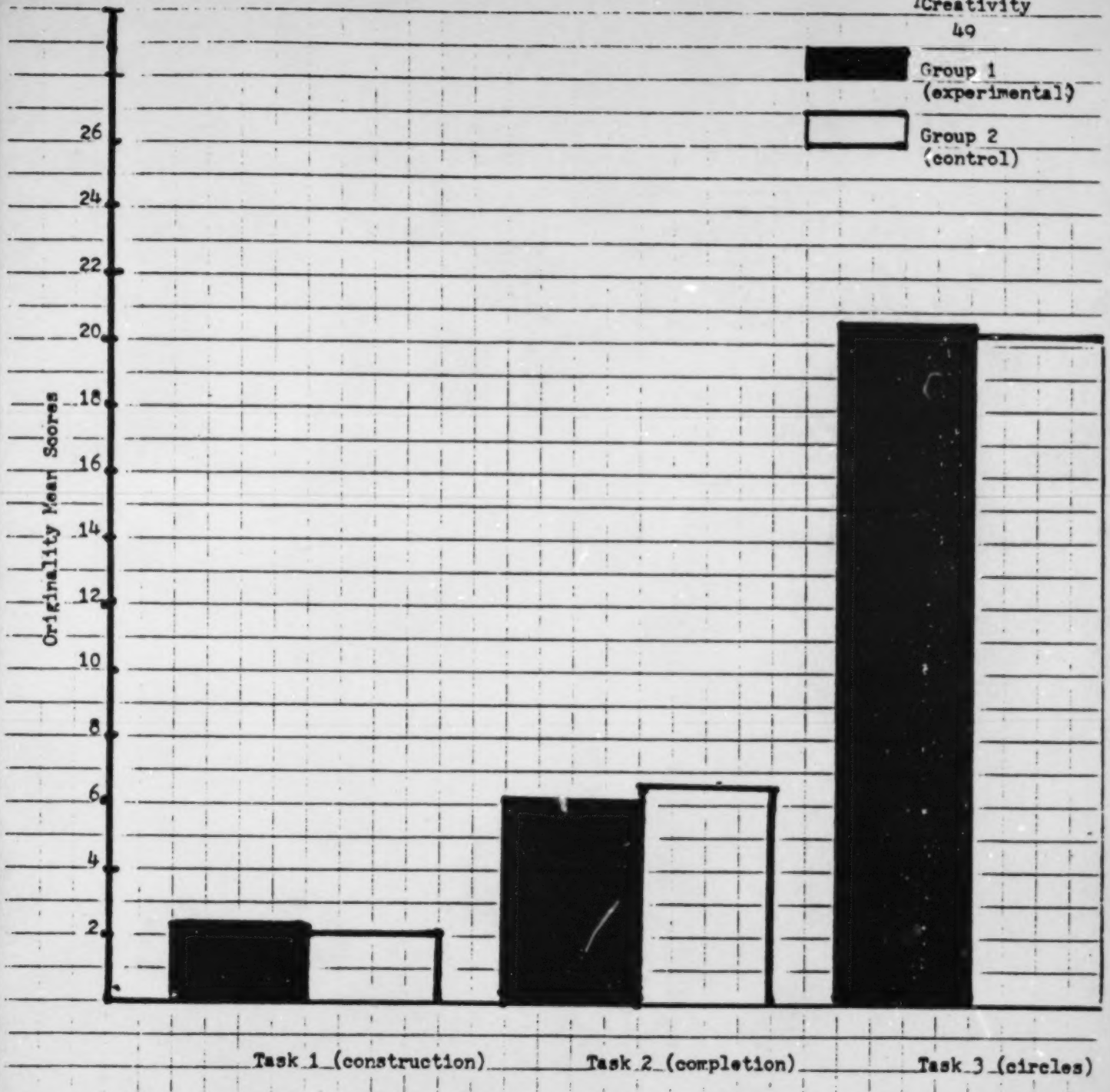


Figure 3. Mean scores on originality displayed by a control group and an experimental group in tasks from the Torrance Tests of Creative Thinking.

Introductory Instructions for the Torrance Test for Creative Thinking*

I think you'll have alot of fun doing the next activity. We are going to do some things that will give you a chance to see how good you are at thinking up new ideas and solving problems. You're going to be able to use all of the imagination and thinking ability you have; so get ready and enjoy yourselves.

Turn over the packets in front of you and fill out the top. In this booklet there are three interesting things for you to do.. All of them will give you the chance to use your imagination to think of ideas and to put them together in various ways. In each activity think of the most interesting and unusual ideas you can; ideas that no one else in this group will think of. After you think of an idea keep adding to it and build it up so that it will tell the most interesting and exciting story possible.

You will be given a time limit on each activity so make good use of your time. There are crayons in the center of the table that you can use as well. Work fast, but don't rush. Try to keep thinking of ideas, but if you run out of ideas before time, sit quietly and wait until the group continues.

If you have any questions after we start, raise your hand and I'll be over.

*Additional verbal instructions for each task are printed inside each test booklet. Instructions are based on those given in the Torrance Directions Manual and Scoring Guide (1974).

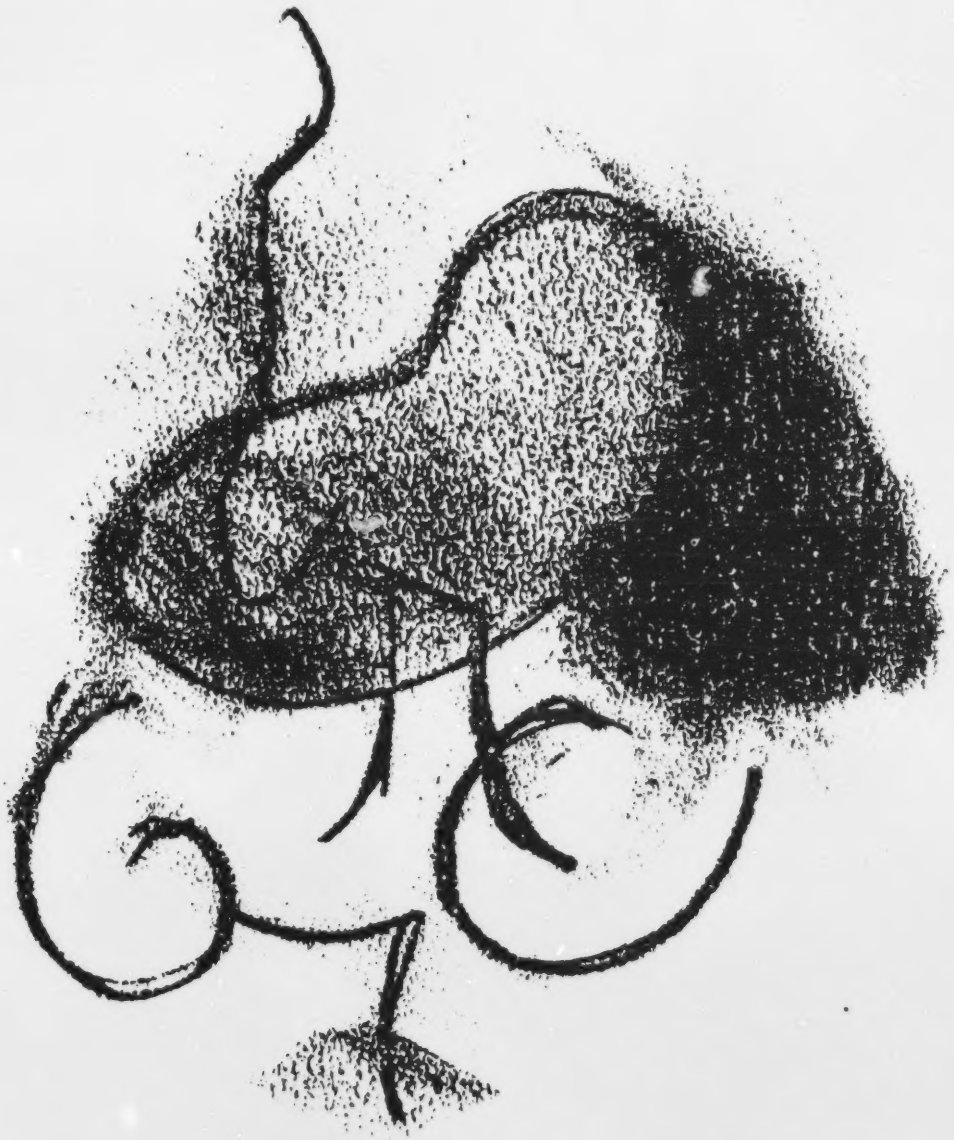
Thinking Creatively With Pictures

By E. Paul Torrance

Booklet B

Name _____ Age _____ Sex _____ Grade _____

School _____ City _____ Date _____



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Activity 1. PICTURE CONSTRUCTION

On the opposite page is a curved shape. Think of a picture or an object which you can draw with this shape as a part.

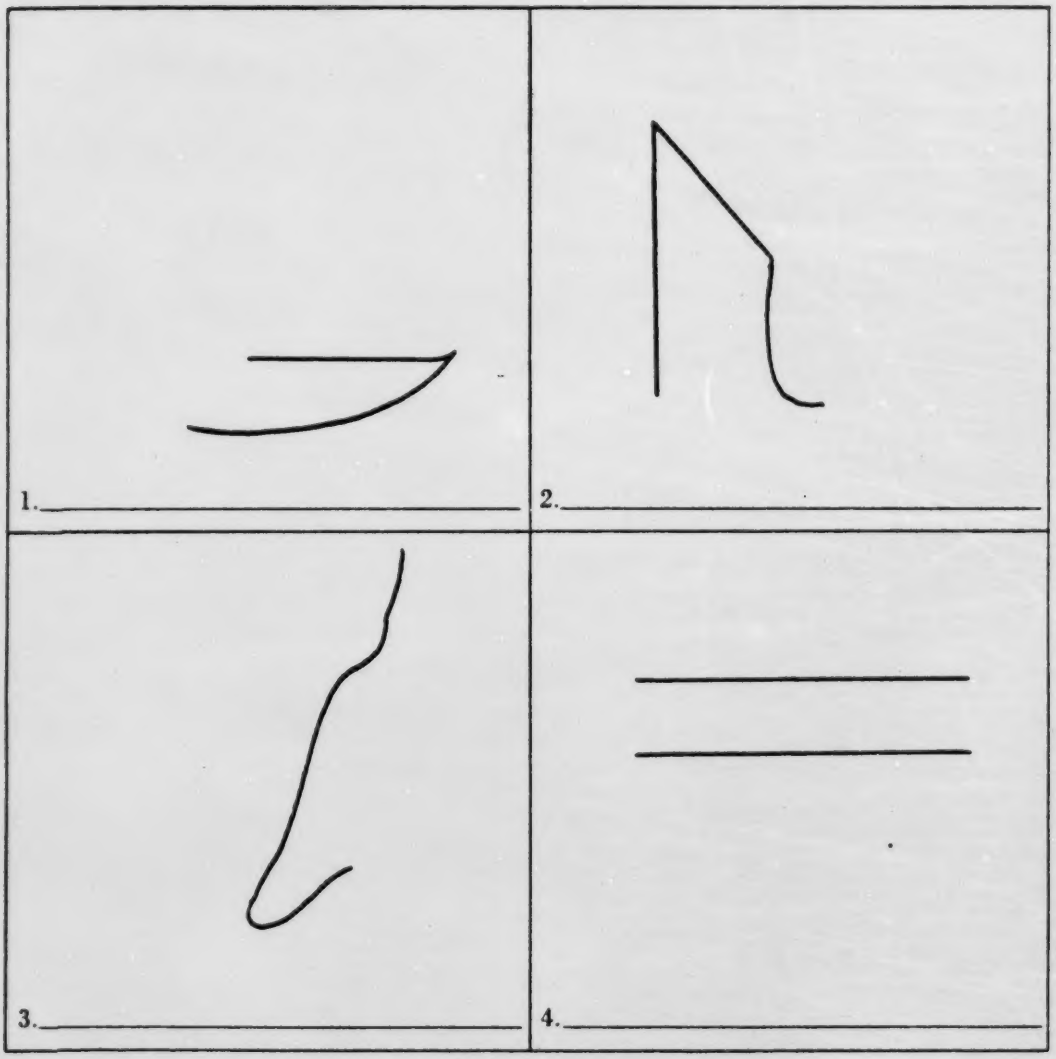
Try to think of a picture that no one else will think of. Keep adding new ideas to your first idea to make it tell as interesting and as exciting a story as you can.

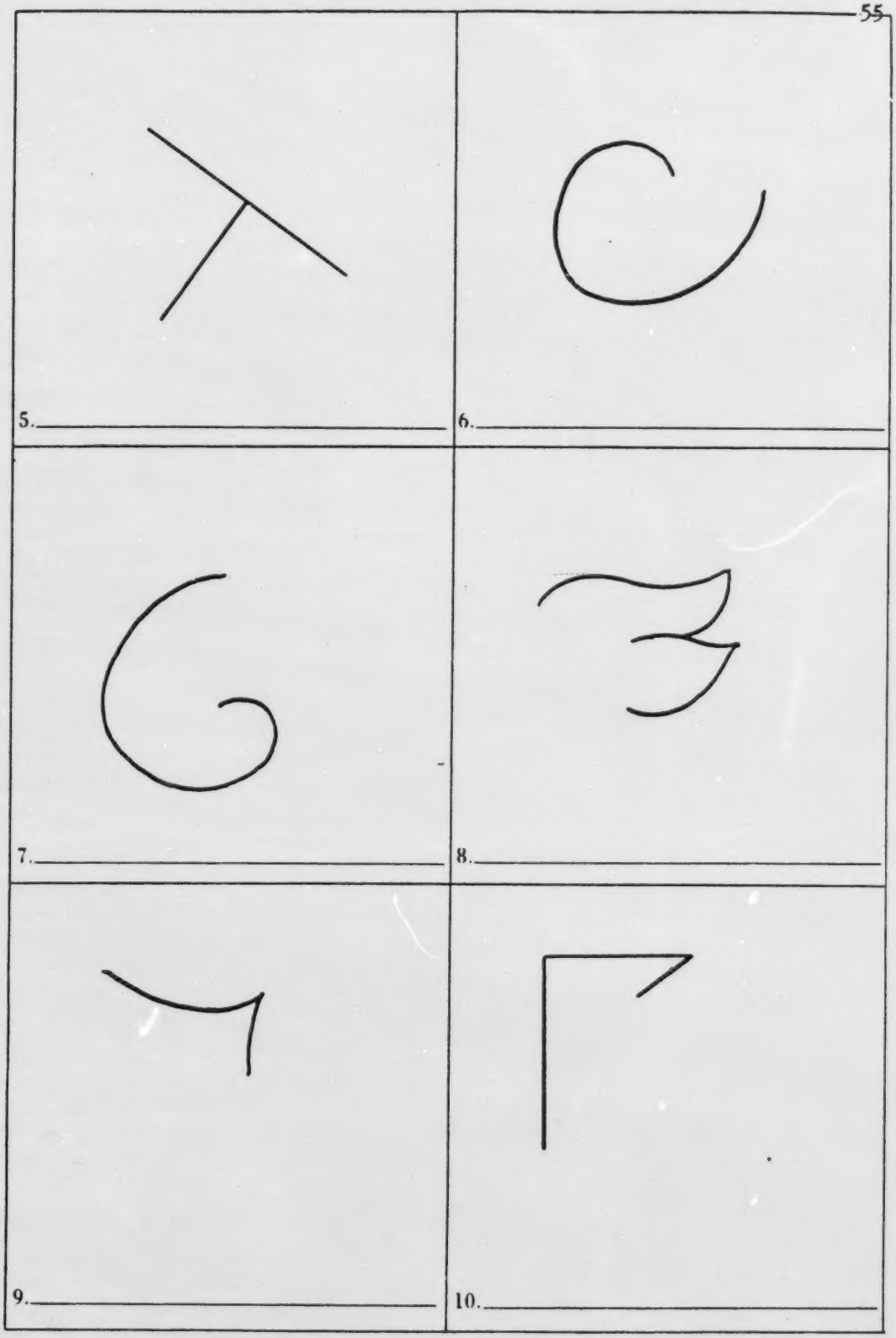
When you have completed your picture, think up a name or title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story.

YOUR TITLE:_____

Activity 2. PICTURE COMPLETION

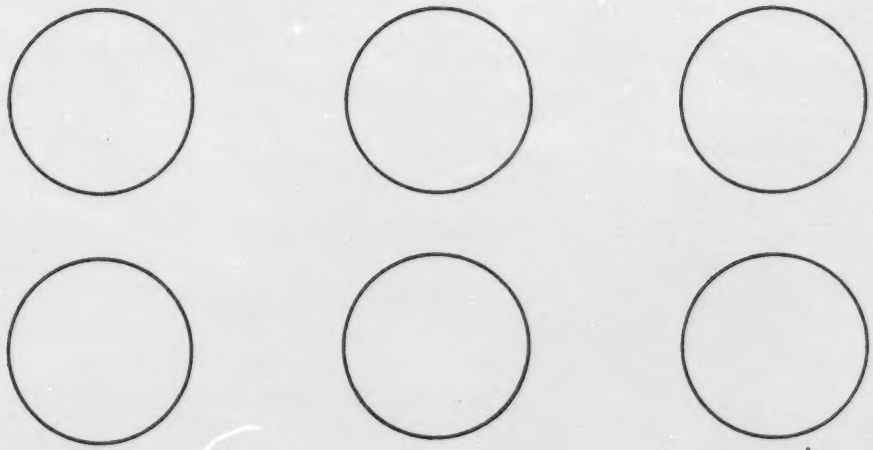
By adding lines to the incomplete figures on this and the next page, you can sketch some interesting objects or pictures. Again, try to think of some picture or object that no one else will think of. Try to make it tell as complete and as interesting a story as you can by adding to and building up your first idea. Make up an interesting title for each of your drawings and write it at the bottom of each block next to the number of the figure.

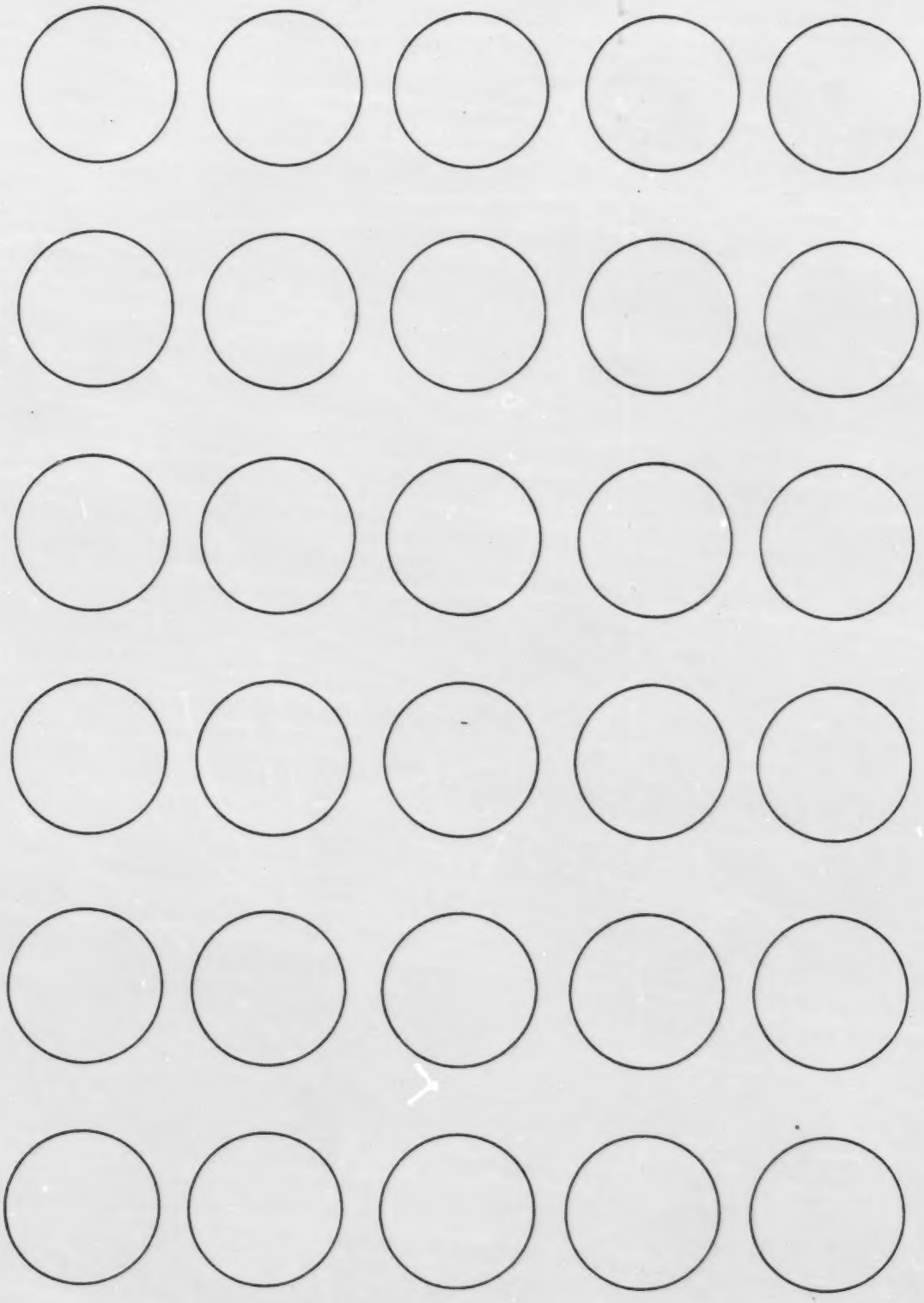



5.
6.
7.
8.
9.
10.

Activity 3. CIRCLES

In ten minutes see how many objects or pictures you can make from the circles below and on the next page. The circles should be the main part of whatever you make. With pencil or crayon add lines to the circles to complete your picture. You can place marks inside the circles, outside the circles, or both inside and outside the circles—wherever you want to in order to make your picture. Try to think of things that no one else will think of. Make as many different pictures or objects as you can and put as many ideas as you can in each one. Make them tell as complete and as interesting a story as you can. Add names or titles below the objects.





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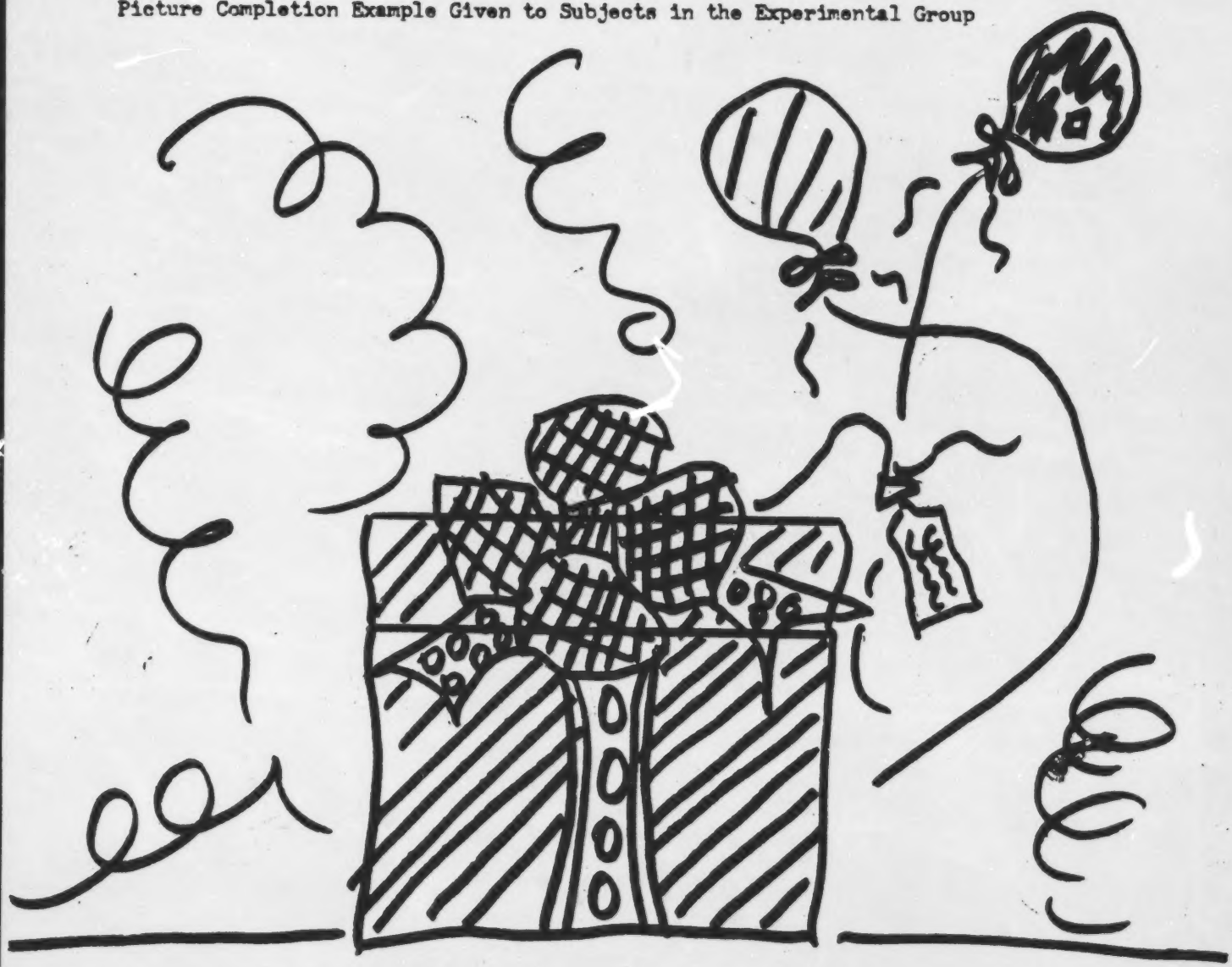
Picture Construction Example Given to Subjects in the Experimental Group*

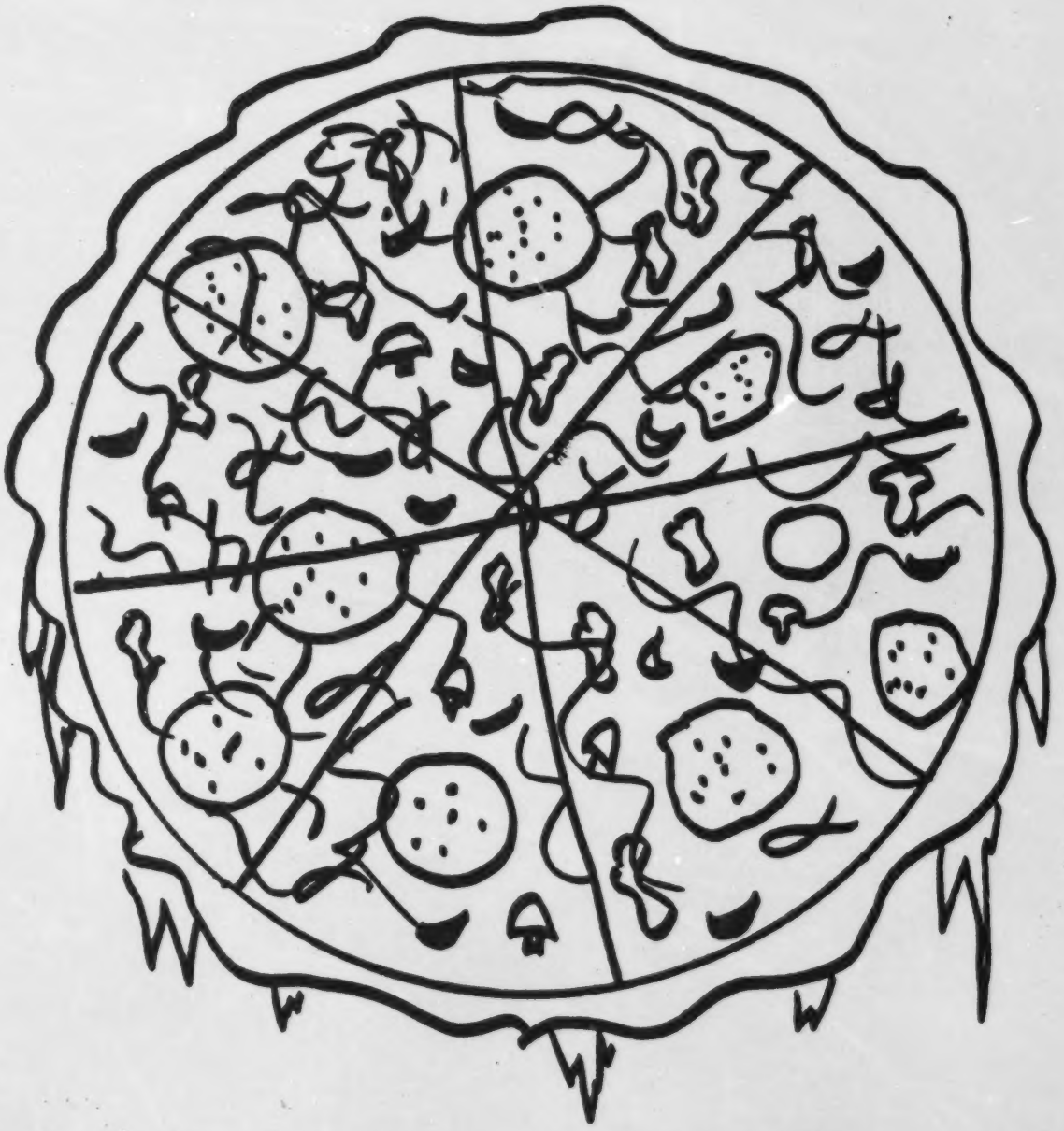
*These examples were given in addition to regular instructions read by the experimenter and printed in the test booklet.

Picture Completion Example Given to Subjects in the Experimental Group



*These examples were given in addition to regular instructions read by the experimenter and printed in the test booklet.

Circles Example Given to Subjects in the Experimental Group



When the pizza was delivered it was cold.

*These examples were given in addition to regular instructions read by the experimenter and printed in the test booklet.

Something About Myself Instructions*

A list of statements is given to you below. All you have to do is read them them carefully and decide if they are applicable to you or not..If a statement is applicable to you show this by placing a check mark on the space provided on your test sheet. If a statement is not applicable to you leave the space blank.

*Instructions are printed in the Manual for Khatena-Torrance Creative Perception Inventory.

SCORING WORKSHEET

TORRANCE TESTS OF CREATIVE THINKING, FIGURAL FORMS A and B

Pupil's Name _____ Sex _____ Test Date _____

School _____ Age _____ Grade _____ Scorer _____

Form _____

Resp No.	Activity 1		Activity 2			Activity 3		
	Orig.	Elab.	Categ.	Orig.	Elab.	Categ.	Orig.	Elab.
1								
2								
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27								
28								
29								
30								

SCORE SUMMARY

	FLU	FLEX	ORIG	ELAB
Act. 1	X	X		
Act. 2				
Act. 3				
TOTAL				
T SCORE				

COMMENTS:

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Remote Associations Test Instructions

This last test is to see how good you are at making remote associations. There are twenty sets of words containing three words in each set. In ten minutes you are to find a word that the three given words have in common. For example, if the set had the words "paint ... doll ... cat," the answer would be "house; house paint, doll house, cat house." Another example , if the set had the words "cookies ... sixteen ... heart," the answer would be "sweet; sweet cookies, sweet sixteen, sweet heart."*

*The modeling group (Group 1) had these examples written on the board for them, and they stayed on the board throughout this examination.

1. stop	[illegible]	[illegible]
2. blue	[illegible]	[illegible]
3. run	[illegible]	[illegible]
4. potion	[illegible]	[illegible]
5. line	[illegible]	[illegible]
6. road	[illegible]	[illegible]
7. house	[illegible]	[illegible]
8. [illegible]	[illegible]	[illegible]
9. warm	[illegible]	[illegible]
10. paintbrush	[illegible]	[illegible]
11. weight	[illegible]	[illegible]
12. race	[illegible]	[illegible]
13. [illegible]	[illegible]	[illegible]
14. hill	[illegible]	[illegible]
15. middle	[illegible]	[illegible]
16. [illegible]	[illegible]	[illegible]
17. play	[illegible]	[illegible]
18. [illegible]	[illegible]	[illegible]
19. [illegible]	[illegible]	[illegible]
20. [illegible]	[illegible]	[illegible]

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Key for the Remote Associations Test

1. foot
2. cheese
3. chair, horse
4. slow
5. party
6. hard, good
7. green, club
8. trick, high
9. paper
10. finger
11. light
12. hand
13. stone
14. dog
15. jack
16. man
17. street, floor
18. car
19. bar
20. bee

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Creativity

Subject's Name _____ Age _____ Sex _____ Grade 66

School _____ Date _____ Scorer _____

SOMETHING ABOUT MYSELF by JOE KHATENA

A list of statements is given to you below. All you have to do is read them carefully and decide if they are applicable to you or not. If a statement is applicable to you show this by placing a check mark (✓) on the space provided on your test sheet. If a statement is not applicable to you leave the space blank.

1. ___When I think of an idea I like adding to it to make it more interesting.
2. ___I am talented in many different ways.
3. ___I like making guesses, testing them, and if I am proved wrong will make new guesses.
4. ___I am an imaginative person, a dreamer or visionary.
5. ___Others consider me eccentric.
6. ___I have composed a dance, song or musical piece for voice or instrument.
7. ___I have painted, drawn, designed, sculptured, carved on wood, made models of my own design, did pottery, or creative photography.
8. ___My productions were on exhibitions or won prizes.
9. ___I like breaking down something organized in a certain way into its component parts and reorganizing it in a different way to make it something no one else would have thought of.
10. ___I have planned or carried out experiments.
11. ___When I am faced with a problem I try to think of original ideas.
12. ___I have played the lead role, directed or produced a play or musical evening.
13. ___I have confidence matching my talents against others.
14. ___I am not afraid to take risks should a need arise.
15. ___I get so interested in what I am doing that I do not know what is happening around me.
16. ___I have been instrumental in bringing about major changes in rules, procedures, organization or structure.
17. ___I do not take for granted the accuracy of what others tell me.
18. ___To make an idea more easily understood I try to relate it to what can be seen, touched or heard.
19. ___I like to temper my thinking with my feelings especially when I am trying to produce.
20. ___I am resourceful.
21. ___I have invented a new product.
22. ___I can spot the source of a problem and define it.

(Over)

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23. ___I have improvised in dance, song or instrumental music.

24. ___I have designed stage lighting for a dramatic or musical evening.

25. ___I like to take various things or ideas that have not been put together before and combine them to make something original.

26. ___I can work for long periods of time without getting tired.

27. ___To be able to laugh or see the funny side of things helps me cope with everyday problems.

28. ___The beautiful delights me.

29. ___I experiment in cooking and make new recipes.

30. ___I see the answers to problems suddenly.

31. ___I have written a story, poem, play, TV or radio script, imaginative essay and the like.

32. ___I prefer to strive for distant goals even if present goals appear more attractive.

33. ___My relations with others must be real and meaningful.

34. ___To risk entering into the unknown would thrill me.

35. ___I am critical of others in a way that leads to improvements and advances.

36. ___I have always the urge to question.

37. ___I am very interested in and open to the ideas of others.

38. ___I think for myself though I may not always be right.

39. ___I prefer to work on my own rather than in a group.

40. ___I can delay making judgments until I have sufficient information.

41. ___I can easily spot missing elements or gaps in knowledge or situations.

42. ___I do not hesitate to be playful and childlike when I am trying to be productive.

43. ___I do not like to have to do things in the way others prescribe for me.

44. ___I am a self-starter and do not have to depend on others to maintain my interest level.

45. ___I like to attempt tasks which others would consider difficult or challenging.

46. ___My desire to excel makes me productive.

47. ___I have produced a new formula.

48. ___I have shown organizational ability.

49. ___I have designed sets or scenery for a dramatic or musical evening.

50. ___I am prepared to review my judgments when new information turns up.

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October 1976

SCORING WORKSHEET
KHATENA-TORRANCE CREATIVE PERCEPTION INVENTORY

SOMETHING ABOUT MYSELF

Subject's Name _____ Age _____ Sex _____ Grade _____

School _____ Date _____ Scorer _____

	Raw Score	Standard Score
Creative Perception Index	_____	_____
Factor Orientations:		
Environmental Sensitivity	_____	_____
Initiative	_____	_____
Self-Strength	_____	_____
Intellectuality	_____	_____
Individuality	_____	_____
Artistry	_____	_____

PROFILE OF FACTOR ORIENTATIONS

Standard Score	ES	I	SS	IN	ID	A
9						
8						
7						
6						
5						
4						
3						
2						
1						

Comments:

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October 1976

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U.S.A.

Figures 4-15. Intra-group correlations for elaboration, originality, remote associations, and creative perception.

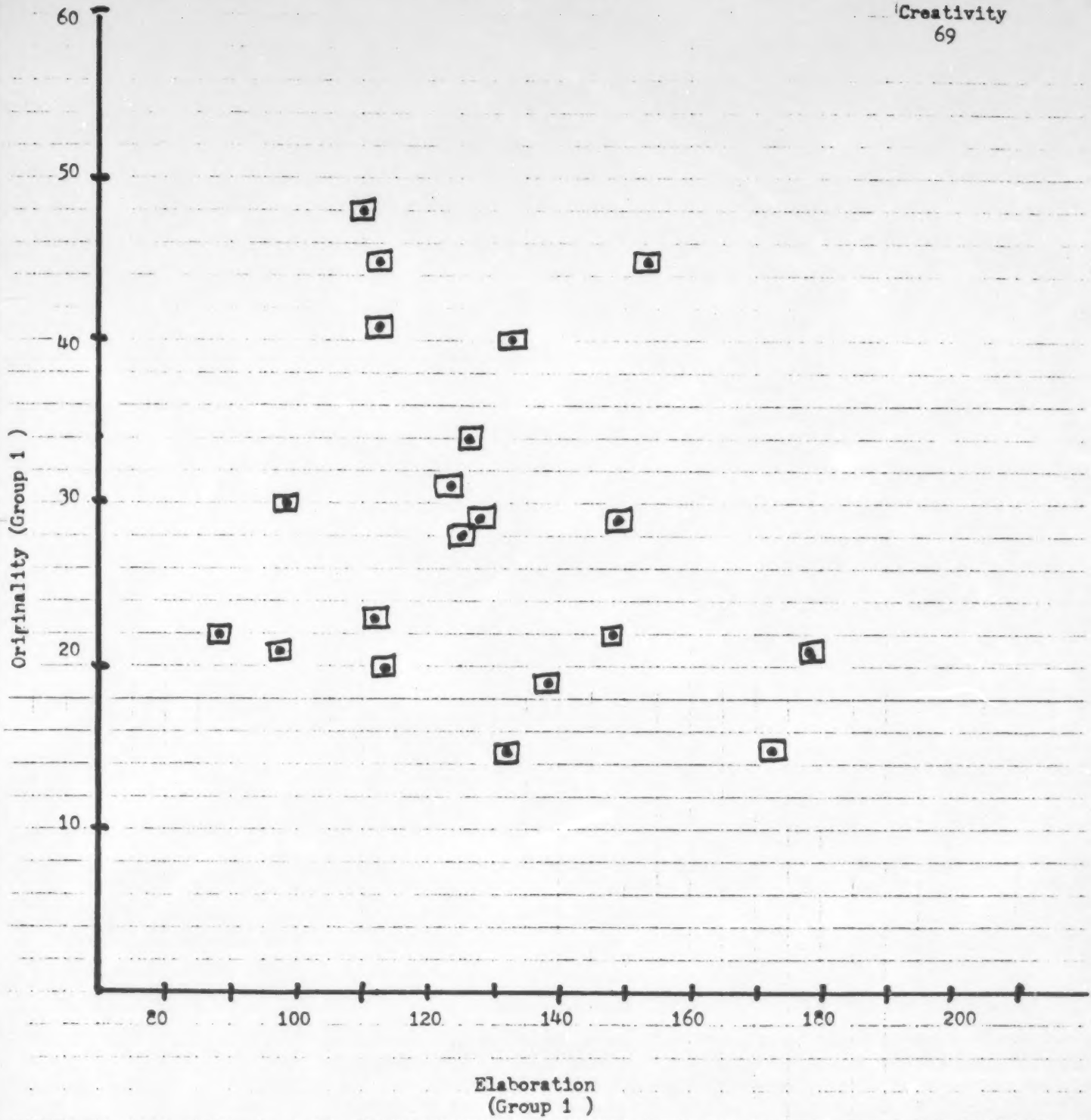

Figure 4. Group 1: elaboration versus originality.

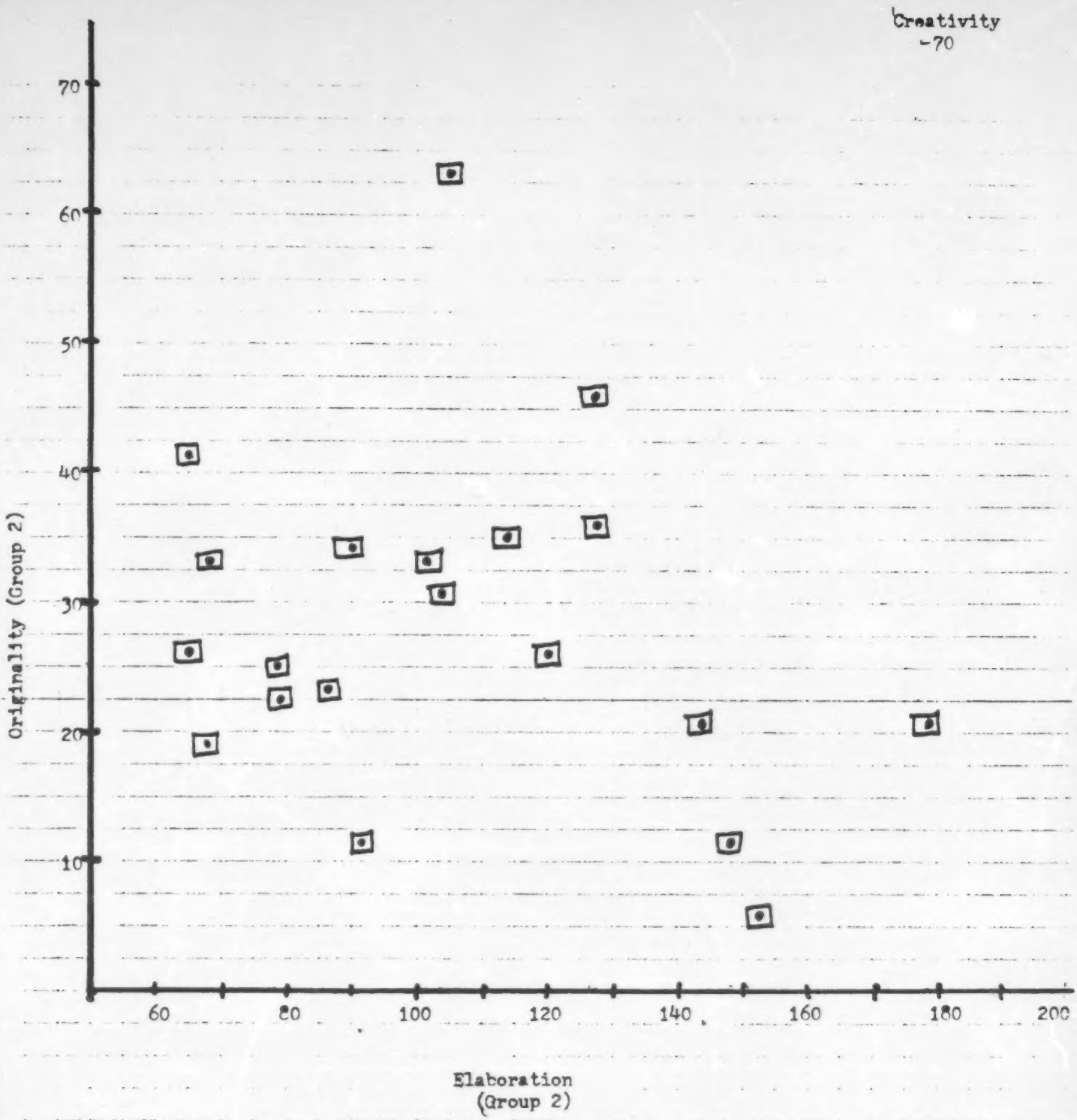

Figure 5 . Group 2: elaboration versus originality.

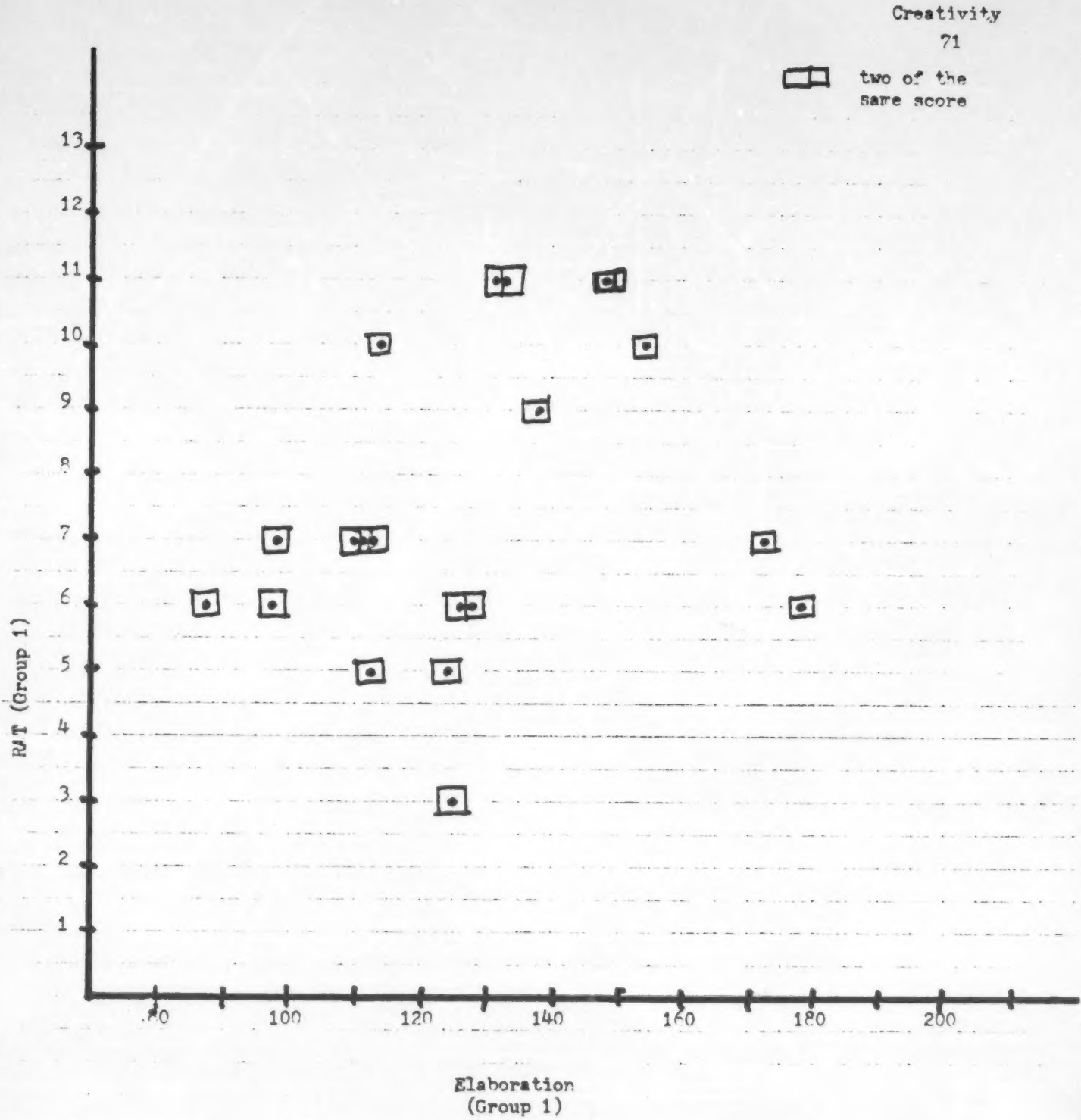

Figure 6`. Group 1: elaboration versus RAT.

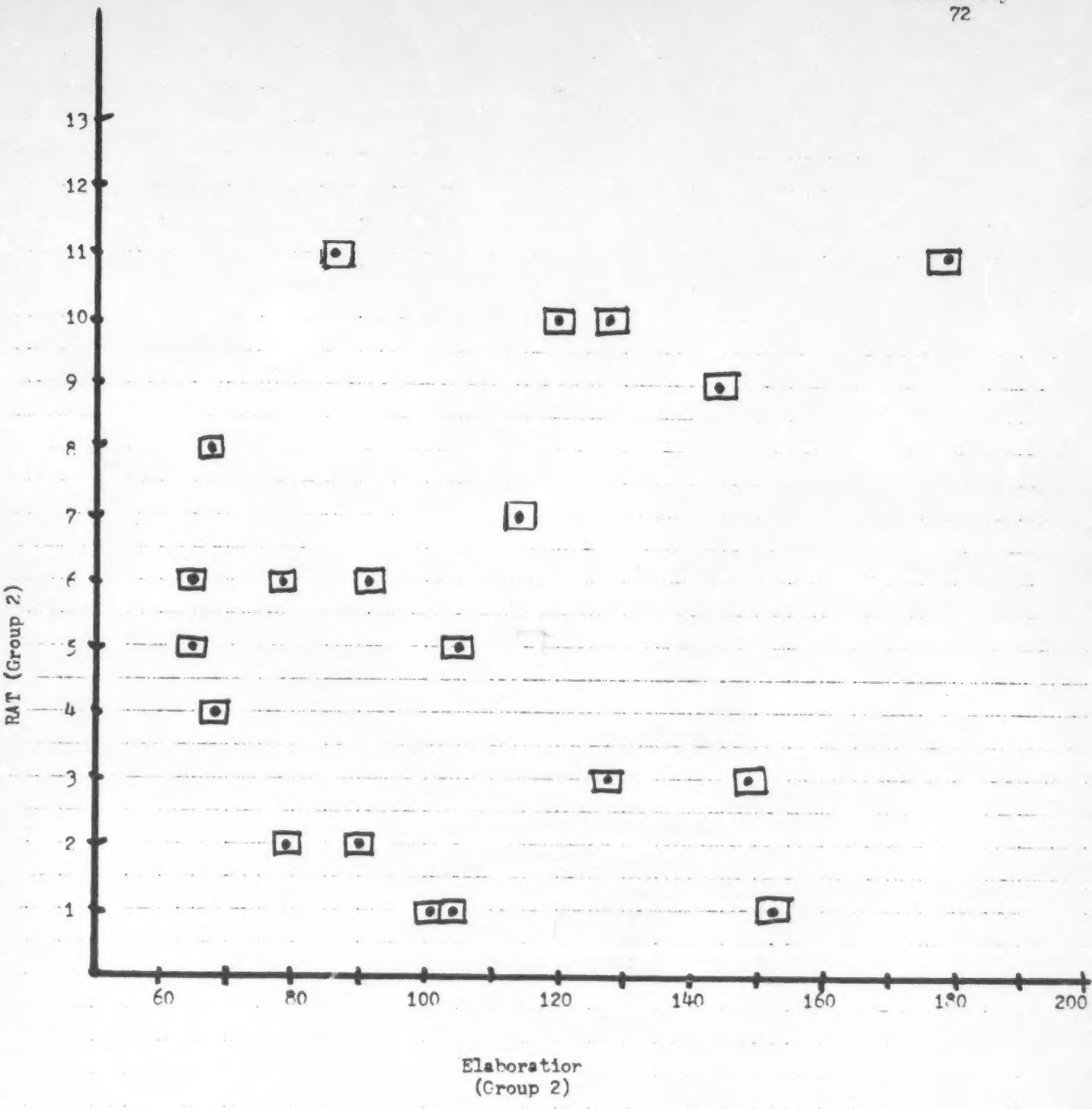

Figure 7 . Group 2: elaboration versus RAT.

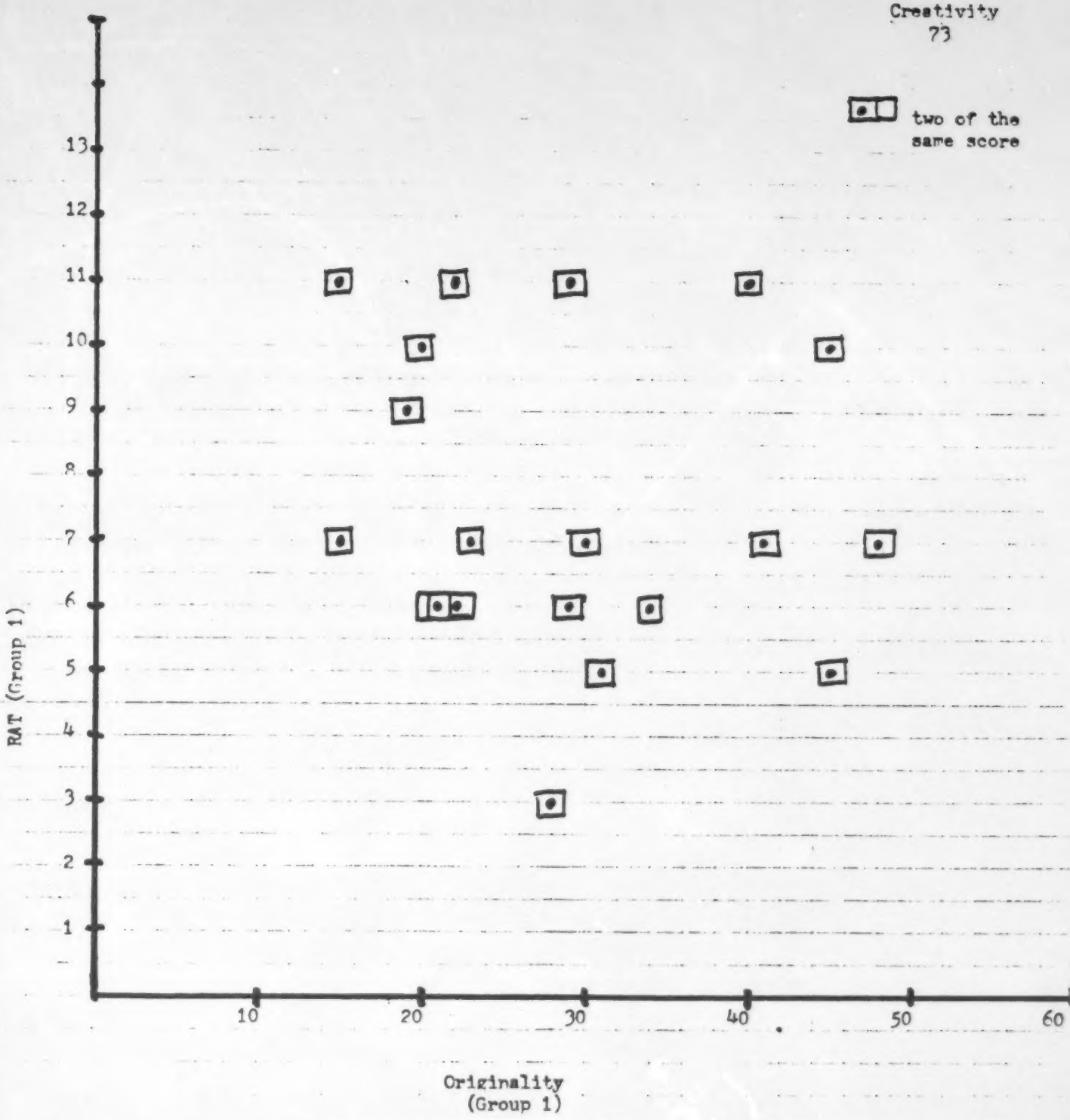

Figure 8 . Group 1: originaltiy versus RAT.

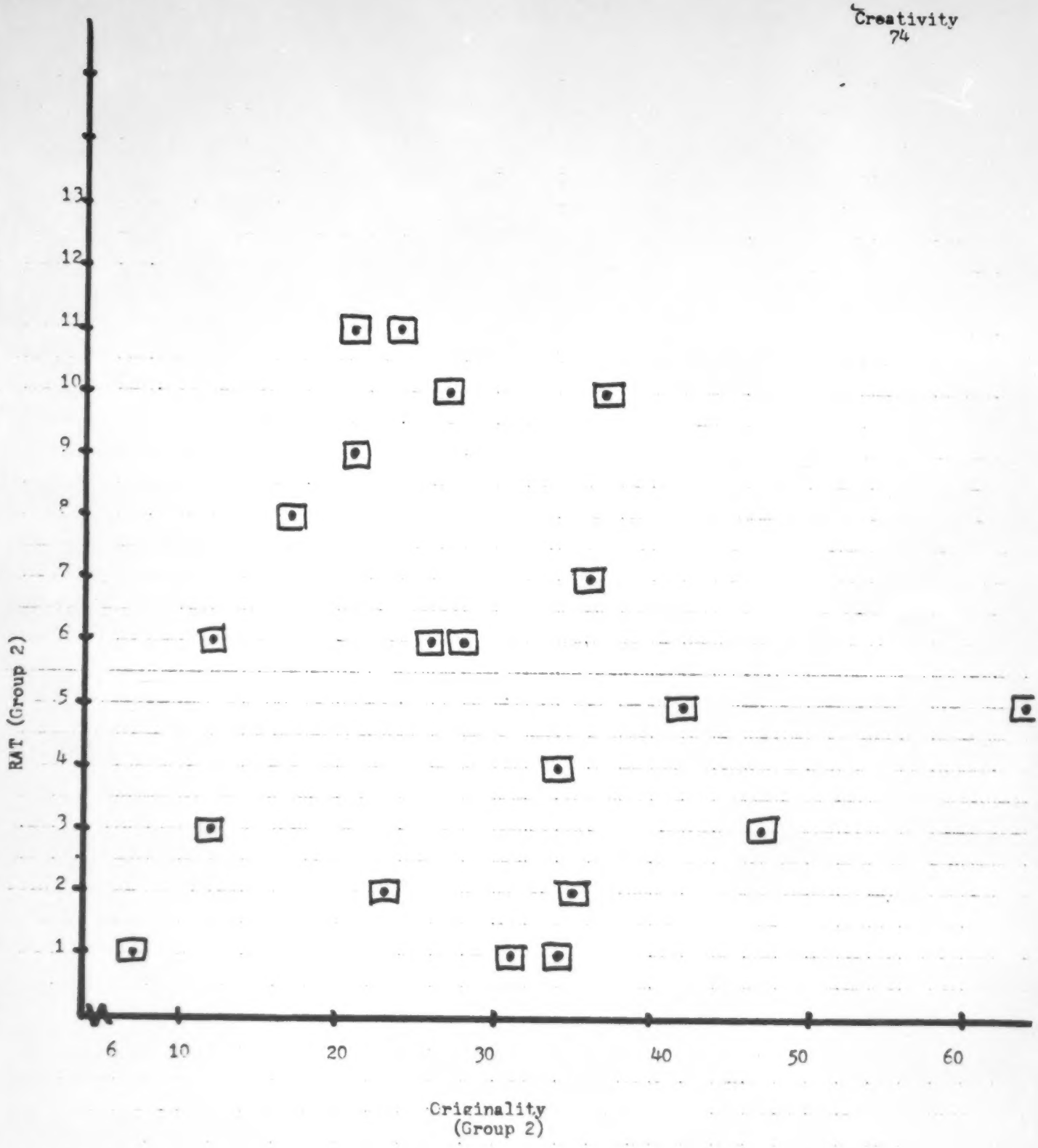

Figure 9. Group 2: originality versus RAT.

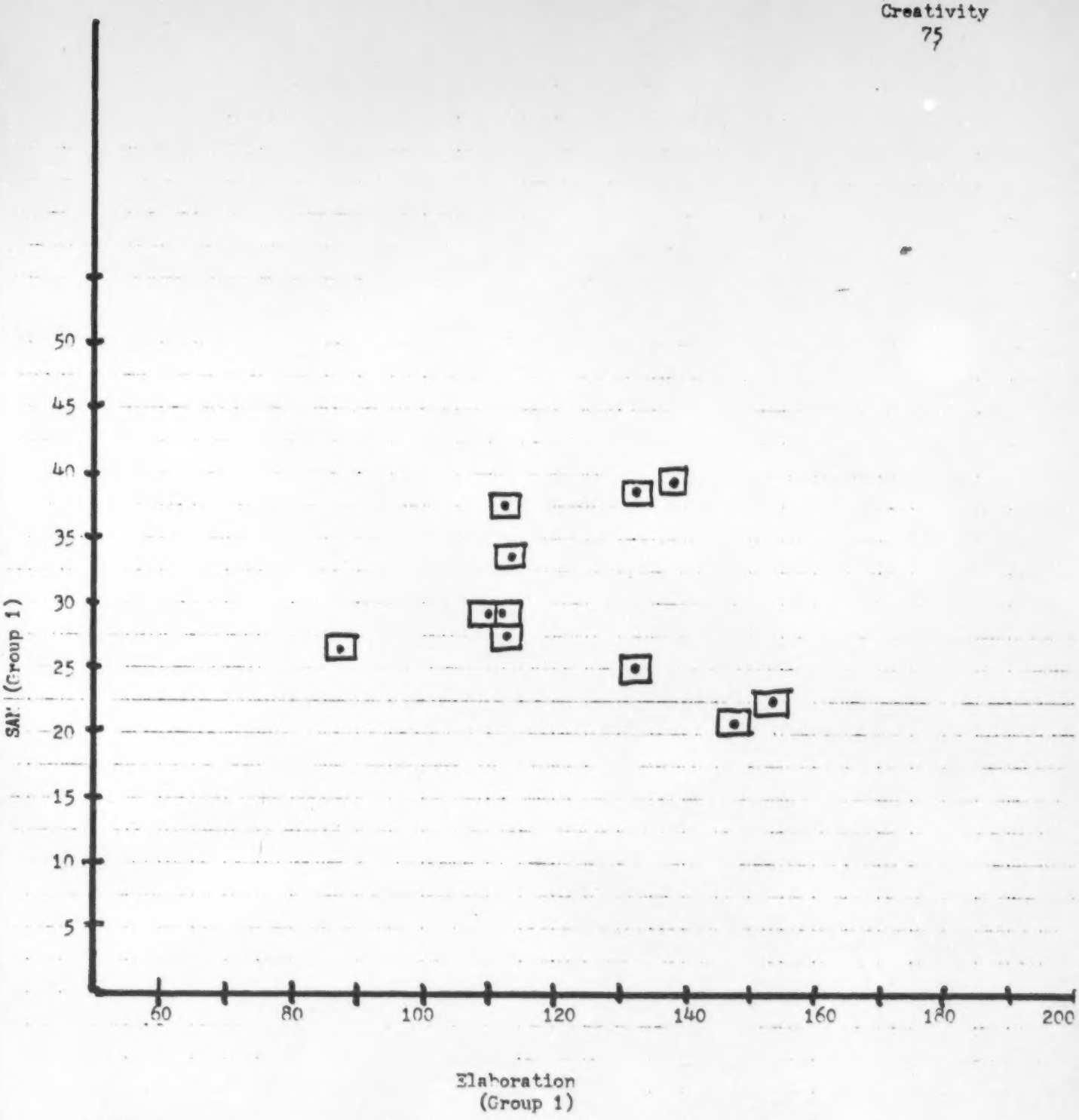

Figure 10. Group 1: elaboration versus creative perception (SAM).

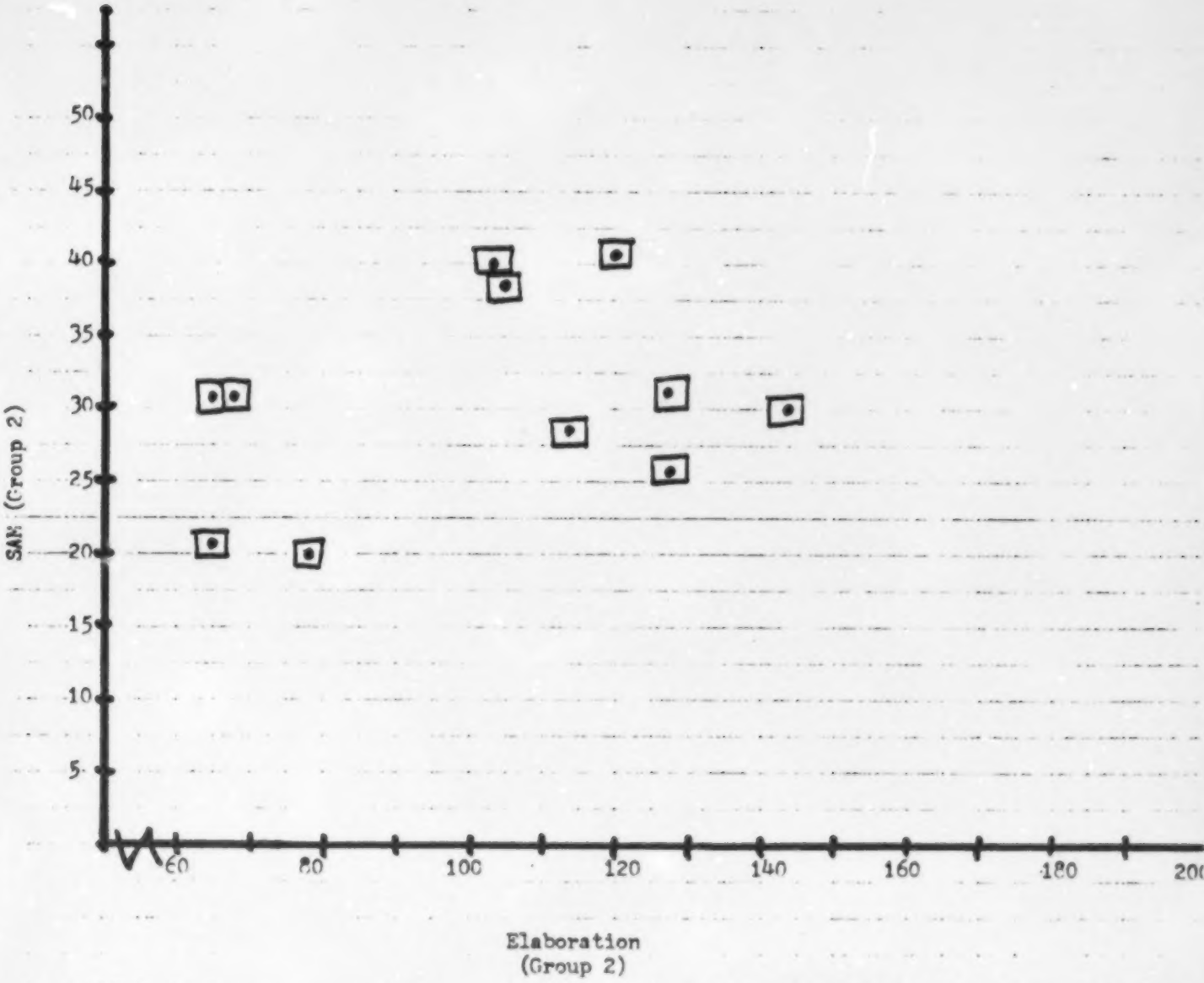

Figure 11.Group 2: elaboration versus creative perception (SAM).

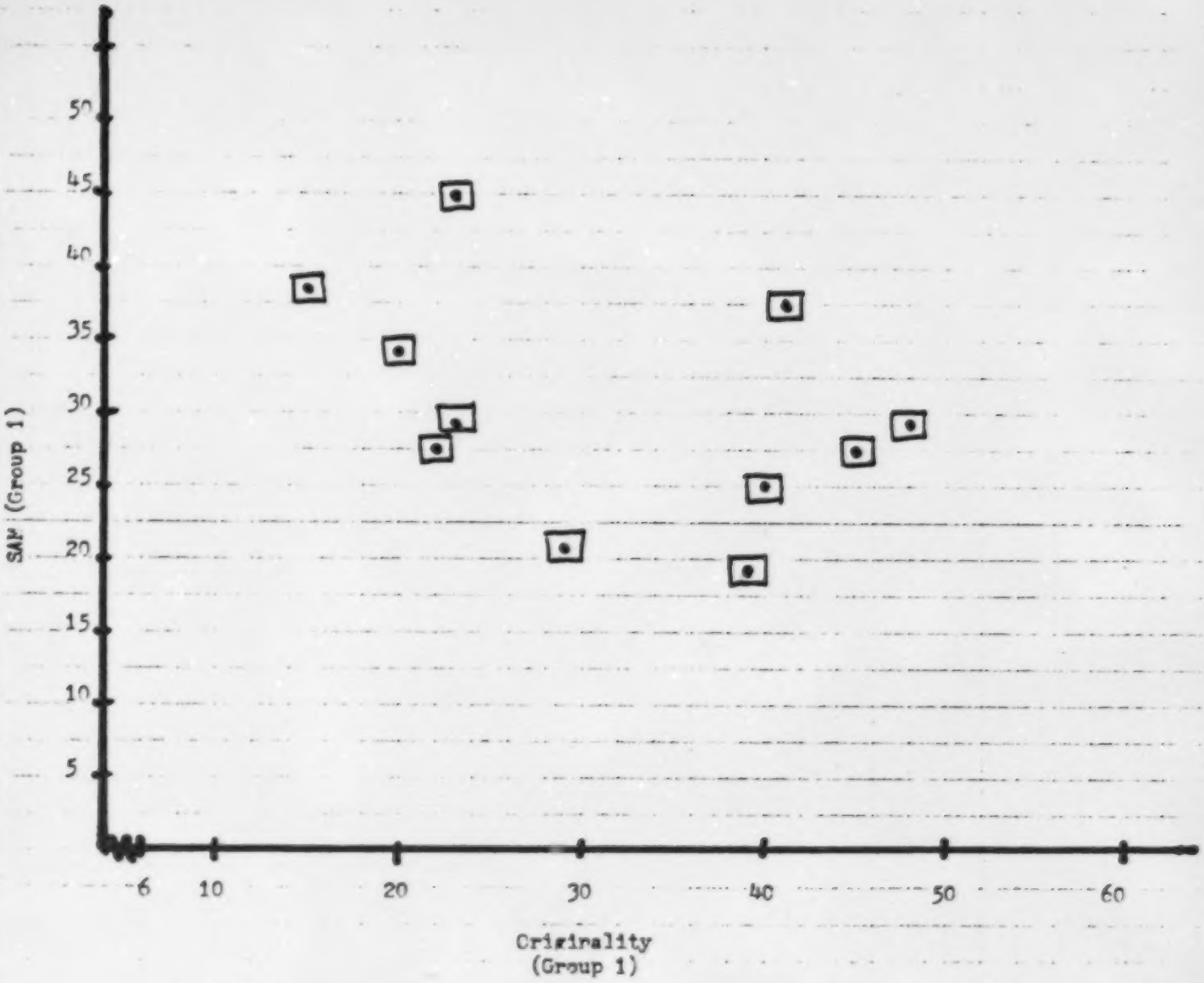

Figure 12 . Group 1: originality versus creative perception (SAP).

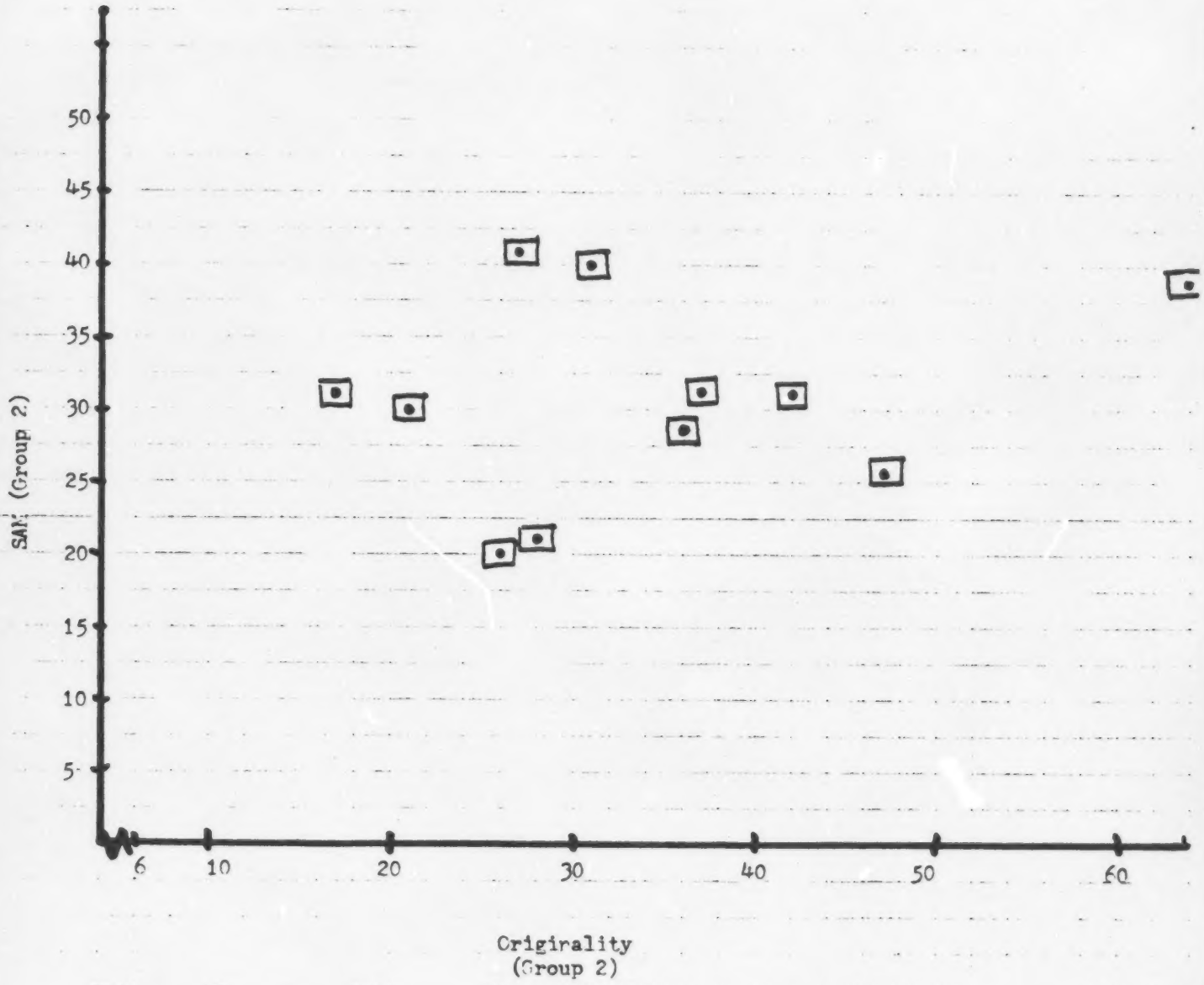

Figure 13. Group 2: originaltiy versus creative perception (SAP).

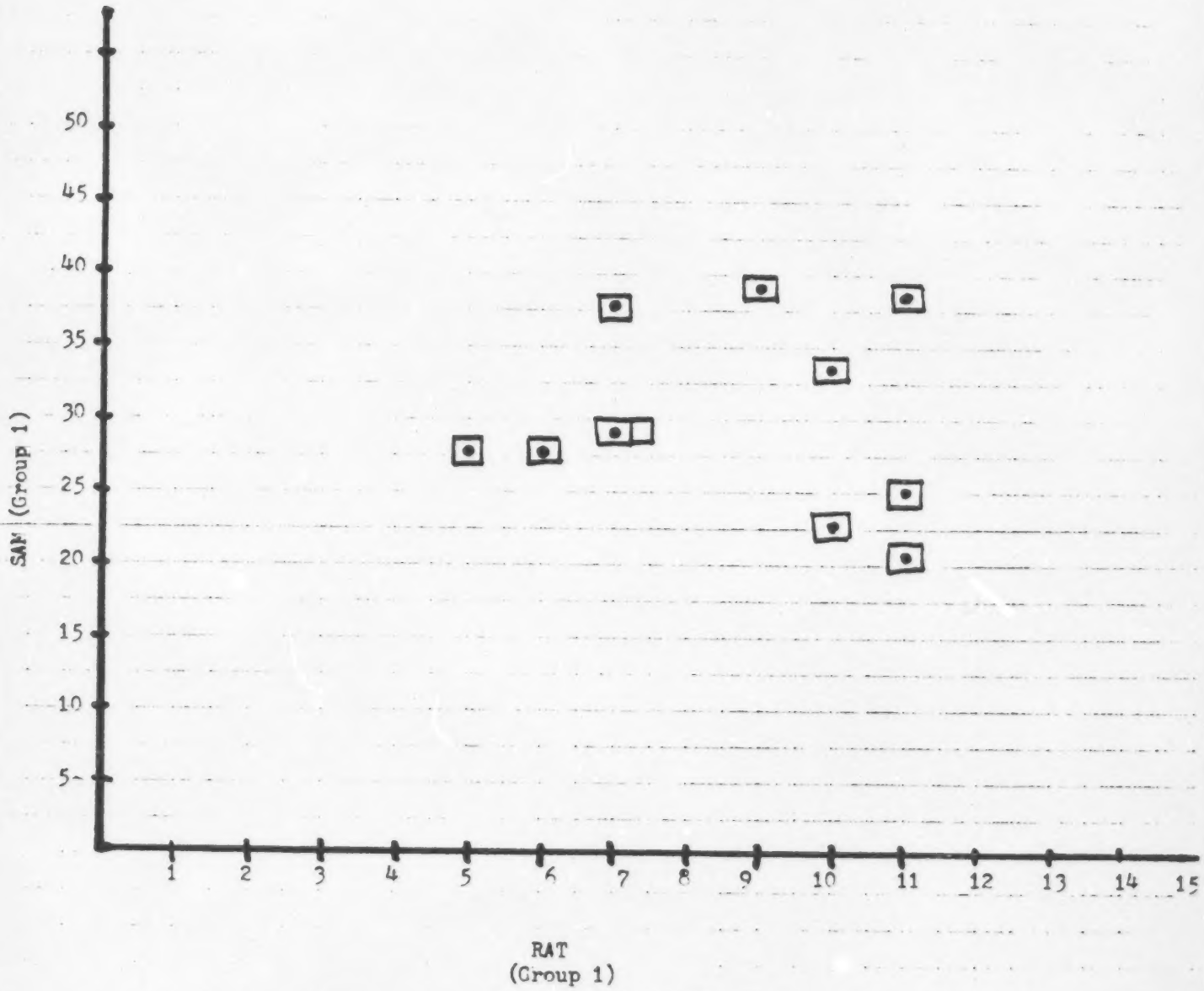

Figure 14. Group 1: remote associations (RAT) versus creative perception (SAM).

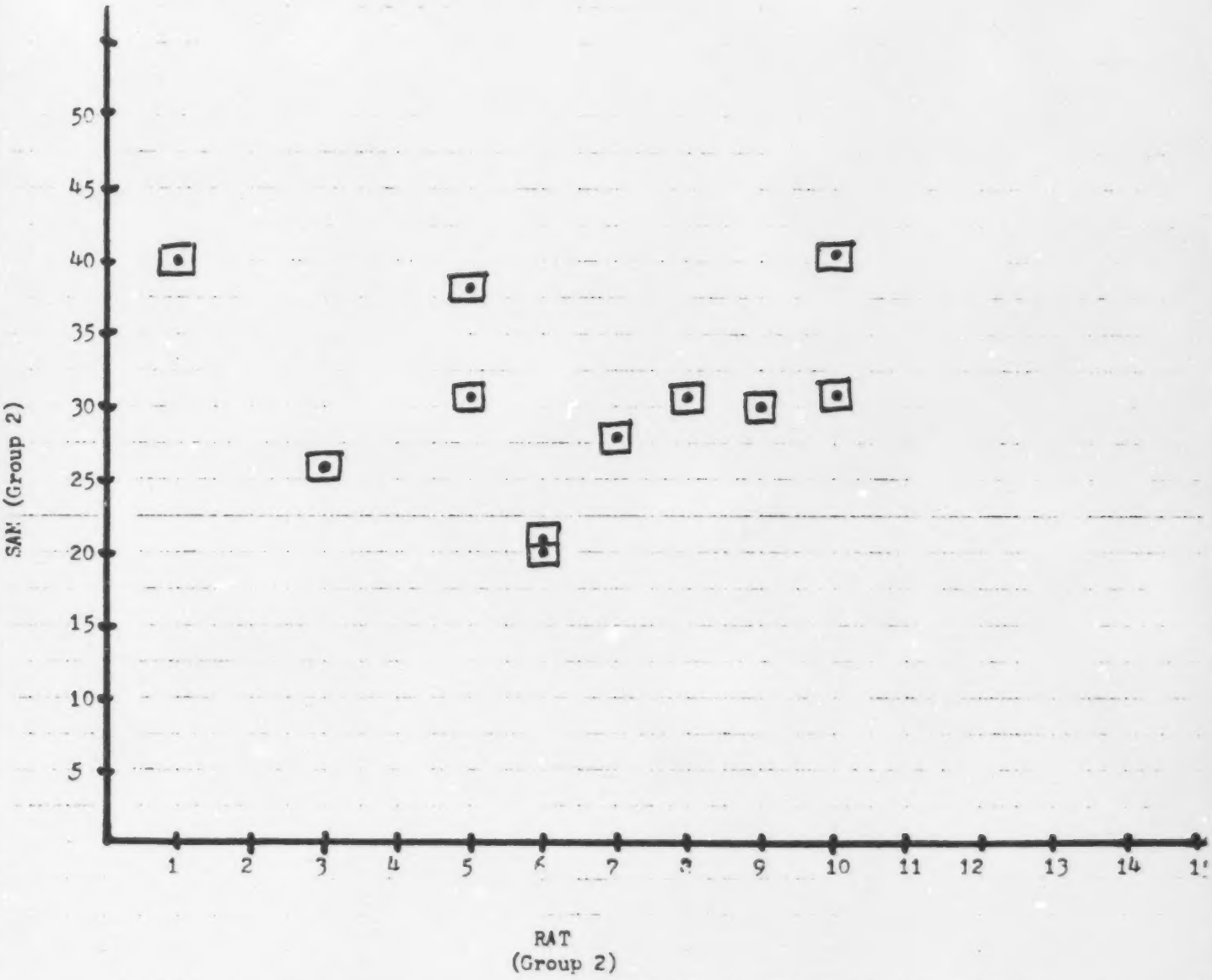

Figure 15. Group 2: remote associations (RAT) versus creative perception (SAT).

ACKNOWLEDGEMENTS

The author wishes to thank Dr. Anna M. Napoli for the extra time and effort she spent as the advisor for this study. She would also like to thank committee members Dr. Thomas Gross, Nancy Hensel and Allen Killpatrick for their help and encouragement. Finally, she would like to thank Jenny Beck for the duplication of this paper.